CLEARWATER COUNTY COUNCIL AGENDA
November 22, 2016
9:00 AM
Council Chambers
4340 – 47 Avenue, Rocky Mountain House, AB

10:00 A.M. Delegation: Agriculture Recreation Committee

10:30 A.M. Delegation: Plains Bison Reintroduction

11:00 A.M. Delegation: Rocky Mountain House Search & Rescue

11:30 A.M. Delegation: Prairie Creek Memorial Cemetery Association

A. CALL TO ORDER

B. AGENDA ADOPTION

C. CONFIRMATION OF MINUTES
   1. November 08, 2016 Regular Meeting Minutes

D. PUBLIC WORKS
   1. 2017 Asphalt Overlay Tender Award

E. PLANNING
   1. Area Structure Plan – Landowner Meeting

F. MUNICIPAL
   1. Review of Town of Rocky Mountain House Municipal Inspection Report

G. CORPORATE SERVICES
   1. Request for Contingency Reallocation

H. AGRICULTURE SERVICES & LANDCARE
   1. Delegation: 10:00 AM Agriculture Recreation Committee
   2. Delegation: 10:30 AM Plains Bison Reintroduction – David Gummer, Wildlife Ecologist, Banff National Park

I. COMMUNITY & PROTECTIVE SERVICES
   1. Delegation: 11:00 AM Rocky Mountain House Search and Rescue
   2. Delegation: 11:30 AM Prairie Creek Memorial Cemetery Association
   3. Central Alberta Economic Partnership Ltd. Business Representative Appointment
   4. Taimi Hall Demolition and Land Update
   5. *TABLED ITEM* Broadband Request for Proposal – Focused Study Area

J. INFORMATION
1. CAO's Report
2. Public Works Director's Report
3. Councillor's Verbal Report
4. Accounts Payable Listing
5. Councillor Remuneration

K. IN CAMERA*
1. Labour
* For discussions relating to and in accordance with: a) the Municipal Government Act, Section 197(2) and b) the Freedom of Information and Protection of Privacy Act, Section 17(1)
2. Labour
* For discussions relating to and in accordance with: a) the Municipal Government Act, Section 197(2) and b) the Freedom of Information and Protection of Privacy Act, Section 19(1)

L. ADJOURNMENT

POSTPONED ITEMS
Date   **Item, Reason and Status**
03/08/16   **087/16 Condor Community Centre Grant Request**
STATUS: Pending Information, Community & Protective Services/Public Works
Date   **Item, Reason and Status**
11/08/16   **358/16 Broadband Request for Proposal – Focused Study Area**
STATUS: Pending Information/Review of Taylor Warwick reports, Community & Protective Services

AGENDA ITEM

PROJECT: 2017 Asphalt Overlay Tender Award		
PRESENTATION DATE: November 22, 2016		
DEPARTMENT: Public Works	WRITTEN BY: Erik Hansen	REVIEWED BY: Marshall Morton/Ron Leaf
BUDGET IMPLICATION: ☐ N/A ☒ Funded by Dept. ☐ Reallocation		
LEGISLATIVE DIRECTION: ☒None ☐ Provincial Legislation (cite) ☐ County Bylaw or Policy (cite)		
STRATEGIC PLAN THEME: Managing Our Growth	PRIORITY AREA: 1.5 Support a transportation network that connects and moves residents and industry	STRATEGIES: 1.5.1 1.5.2
RECOMMENDATION: That Council reviews this information and approves awarding the 2017 Asphalt Overlay Tender to Border Paving Ltd.		

BACKGROUND:

The Administration has tendered the proposed 2017 Asphalt Overlay program. This program includes re-surfacing, side slope improvement and other work for the Prairie Creek Road from the junction of Hwy 752 to Hwy 22. (22.3 Km).

A Tender Opening was held on November 3, 2016 at 2:00 p.m. for the work outlined above. We received 7 bids**,** with **Border Paving Ltd.** being the low valid bidder. The cost for this project came in **$1,001,494.00** under the engineers estimated amount of **$3,917,457.00**

The following is a summary of the bid prices received:

Border Paving Ltd.	**$2,580,918.00**
Lahrmann Construction Inc.	$2,622,937.00
Sandstar Construction Ltd	$2,646,500.00
Ledcor Alberta Ltd.	$2,800,797.28
Central City Asphalt Ltd.	$2,935,400.00
Carmacks Enterprises Ltd.	$2,951,690.00
E. Construction Ltd.	$3,204,993.00

Border Paving Ltd.	Tender Pricing.	Estimated Amount
Construction (less Site Occupancy)	$2,514,918.00	$3,409,000.00
5 % Contingency	$ 125,745.00	$ 170,450.00
Potential Site Occ. Bonus	$ 6,000.00	$ 6,000.00
Potential EPS Bonus	$ 93,300.00	$ 93,380.00
Engineering	$ 176,000.00	$ 238,627.00
Total	**$2,915,963.00**	**$3,917,457.00**

AGENDA ITEM

PROJECT: Area Structure Plan – Landowner Meeting		
PRESENTATION DATE: November 22, 2016		
DEPARTMENT: Planning & Development	**WRITTEN BY:** Rick Emmons / Keith McCrae	**REVIEWED BY:** Ron Leaf
BUDGET IMPLICATION: ☐ N/A ☒ Funded by Dept. ☐ Reallocation		
LEGISLATIVE DIRECTION: ☐None ☐ Provincial Legislation (cite) ☒ County Bylaw or Policy (cite) Bylaw: _____ Policy:_____IDP & MDP & ASP_____		
Planning Objective 1.1 - Plan for a well designed and built community.	**1.3.1** Collaborate with the Town of Rocky Mountain House to identify growth areas adjacent to the Town with the intent of addressing the lack of serviced residential, commercial and industrial properties.	**Strategic Area 1.1.2:** Prepare statutory plans and design guidelines that supports the creation of sustainable residential, commercial and industrial development while balancing the need for protection of agricultural lands and environmentally significant areas.
ATTACHMENT(S): Landowner Notification		
RECOMMENDATION: For Council to receive the information as provided by Administration and approve Council's attendance for the Nov. 29/16 at 7:00pm meeting, to be held in the Christenson Sports & Wellness Centre in the Subway Room.		

BACKGROUND:

As Council is aware, Clearwater County and the Town of Rocky Mountain House have collaborated on a joint development initiative to the north of Rocky Mountain House and called this initiative the "Joint Development Area" (JDA).

To ensure a well-planned development and land use, Clearwater County's Intermunicipal Development Plan (IDP) requires an Area Structure Plan (ASP) to help guide development in a logical and methodical process.

Administration has organized a meeting to be held on Nov. 29/16 at 7:00pm in the Subway Room for the pupose of providing the affected landowners an opportunity to be engaged, informed, and provide input into the ASP being drafted.

October 27, 2016

"Regular Mail"

RE: Landowner Meeting

Dear Landowner,

This letter is to invite you to attend an information meeting that Clearwater County will be hosting for landowners affected by the Area Structure Plan that the County is currently preparing. The Area Structure Plan includes eleven quarter sections located north of Airport Road. The purpose of this meeting will be to discuss some of the details regarding the Plan. The meeting is scheduled to take place on November 29, 2016 at 7:00 pm, at the Christenson Sports & Wellness Centre in the Subway room. We hope you can make it out as we value your input regarding the Area Structure Plan.

Should you have any questions regarding the proposed meeting, or if you are unable to attend the meeting and would like more information, please contact me at (403) 845-4444 or by email at dbisson@clearwatercounty.ca.

Sincerely

Dustin Bisson
Planner

AGENDA ITEM

PROJECT: Review of Town of Rocky Mountain House Municipal Inspection Report		
PRESENTATION DATE: November 22, 2016		
DEPARTMENT: Communications	**WRITTEN BY:** Christine Heggart	**REVIEWED BY:** Rodney Boyko
BUDGET IMPLICATION: ☒ N/A ☐ Funded by Dept. ☐ Reallocation		
LEGISLATIVE DIRECTION: ☒None ☐ Provincial Legislation (cite) ☐ County Bylaw or Policy (cite) Bylaw: _____ Policy:_____		
STRATEGIC PLAN THEME: Well Governed and Leading Organization	**PRIORITY AREA:** Strategic Management Compliance	**STRATEGIES:** • Build community trust through socially responsible governance for long term sustainability. • Ensure timely compliance with statutory and regulatory obligations.
ATTACHMENT(S): Link to Town of Rocky Mountain House inspection report		
RECOMMENDATION: That Council receives the review of the Town of Rocky Mountain House Inspection Report as information.		

BACKGROUND:

In November, Municipal Affairs officials presented the results of the Town of Rocky Mountain House's municipal inspection to the community. The report included three categories of recommendations: Governance, Financial and Administration and Operations.

As Clearwater County is a partner with the Town, and works closely with the Town to provide several of the regional services indicated in the report, Administration has reviewed the report closely and intends to develop an action plan to proactively address any areas in which the County can also improve – with the bulk of the recommendations being simple process or procedural changes.

GOVERNANCE
Many of the report recommendations under the governance category include items which the County already has practices in place to address, such as: Councillor Training and Orientation, Strategic Planning, Service Reviews and Evaluations, Collaboration and Communications.

With the new Municipal Government Act (MGA) anticipated to be proclaimed this fall, and associated regulations to be developed and take effect over the next few years – Staff continue to monitor and assess the impacts of the new MGA and will develop plans to continue to enhance the County's existing practices to meet or exceed the requirements of new legislation.

There were a few recommendations with the governance category of the report that are applicable to the County, including the review of Bylaws and Policies. For example, Administration plans to review policies and develop or update bylaws for Council Committees (i.e. FCSS), Councillor/Board remuneration, Councillor/Board Code of Conduct, fees (i.e. permits, fire services, printed materials) and records management.

FINANCIAL

The County's Internal Controls, Fiscal Analysis, Tax Recovery, Project Cost Tracking and Financial Reporting practices appropriately address almost all of the report's financial recommendations. Administration has included improving the Financial Reporting policy in the 2017 work plan. Administration will, in consultation with Council, modernize future budget/financial statements to include performance measures and ensure timing of statements aligns with Council's needs.

ADMINISTRATION AND OPERATIONS

The County's existing practices for Council Meeting Minutes, Bylaw Access, Human Resources and Health and Safety all meet or exceed legislative requirements. For Council Agendas, moving forward Administration will include more specific detail in terms of exceptions under the Freedom of Information and Protection of Privacy (FOIPP) Act allowing for the meeting to be closed to the public.

The Information Systems recommendation in the report is one which the County is already in the progress of addressing with a strategic planning /information systems review, underway since early 2016.

The remainder of the recommendations in this category, such as FireSmart, Bylaw Enforcement and Organizational Structure have already been addressed through various programs or Service Level review processes.

AGENDA ITEM

PROJECT: Request for Contingency Reallocation		
PRESENTATION DATE: November 22, 2016		
DEPARTMENT: **Information Technology**	**WRITTEN BY:** **Rodney Boyko**	**REVIEWED BY:** **Rick Emmons**
BUDGET IMPLICATION: ☐ N/A ☐ Funded by Dept. ☒ Reallocation		
LEGISLATIVE DIRECTION: ☐None ☐ Provincial Legislation (cite)		
STRATEGIC PLAN THEME: **Well Governed and Leading Organization**	**PRIORITY AREA:** **Service Levels that balance needs with Organizational capacity**	**STRATEGIES:** **Provide facilities and services in an effective and cost efficient manner**
RECOMMENDATION: To approve the Firewall, Storage, Mobility and Office upgrades and that administration be allowed to reallocate both Capital and Operating accounts as needed within the $200,000 project allowance and reallocate funds to a maximum of $50,000 from contingency.		

BACKGROUND:

Clearwater County provided $480,000 in the 2016 budget for the Technology Department Capital budget. Of this allocation $130,000 was for projects for other departments that are currently underway. From the remaining $350,000, $110,000 was allocated towards Server hardware and Storage upgrades, $120,000 to implementing the strategic plan and the remaining to various other hardware replacements such as photocopiers and various other capital items.

The server upgrade in the spring primarily involved a contractor refurbishing server hardware for our staff to migrate our programs and data from the old platform to the refurbished hardware. While the hardware was ordered in 2015 but delayed, the hardware was ready to go in the spring of 2016. As Council is aware, the migration process performed by staff did not go smoothly, and resulted in considerable downtime for the entire staff and created continual issues throughout the year.

The IT situation is currently in a significant situation of risk. The current infrastructure is in need of some significant changes to bring about both stability and functionality, as well as redundancy in Disaster Recovery and Business Continuity capabilities.

Our mail systems are poorly established experiencing frequent mail delays, blacklist issues and lost mail, as well as seeing frequent disconnects forcing VDI user to use Outlook in a cached mode, thereby increasing mail delays and inconsistencies.

Our current VDI (Virtual Desktop) infrastructure has been poorly architected and as a result, users are experiencing extreme slowness and significant challenges during basic day to day operation resulting in frustration and lost productivity.

Currently Storage Capacity (Data Storage) is nearing the 90% mark on all solutions limiting our currently ability to rectify issues (speed and stability) with current products such as Diamond and Worktech as well as VDI.

With these issues, and a substantial list of others, we need to start making some large impactful changes to the infrastructure to allow us to execute on a significant number of changes that will begin to improve the functionality and stability of the environment and prepare us for Disaster Recovery and Business Continuity Planning opportunities in the future.

Urgent Changes that need to be made to start this process include:
- **Firewall Upgrades and updates**: Adding Redundancy and High Availability, Improved mail filtering and management as well as domain reputation management to avoid blacklist issues.
- **Nimble Storage Upgrade**: Addition of a storage tray to the current appliance to allow data to be migrated to faster disk and allow for other changes to occur (Swing Space). Speed increases to both VDI and core applications to be realized.
- **Purchase of desktop and laptops for mobility initiative:** Power users and users requiring mobility are not served well by the current VDI environment. Removing these users from VDI and replacing their stations with the appropriate hardware will result in considerable efficiencies.
- **Office 365 Migration**: To improve mail accessibility, reliability and performance as well as offset Licensing costs for Office products and cost avoidance for needed Exchange Server upgrades.

The estimated cost of this project will be $200,000. For these to be properly implemented, Administration has contacted vendors in the four main areas. There are professionals available to complete these upgrades in the current year. Administration has approximately $150,000 remaining between the operating and capital accounts, however reallocations are most likely needed between operating and capital dependent on the exact item. This available budget may be reduced by outstanding invoices that senior administration may not be aware of, therefore we are reviewing if there are any

outstanding invoices for this budget line. Administration is requesting access to the contingency funds to a maximum of $50,000.

Administration is recommending Council approve the project, with the provision that Administration be allowed to utilize both capital and operating funds that are available in the Technology budget and return to Council upon completion of the project for Council to ratify the reallocations of budget, along with the needed access to contingency.

AGENDA ITEM

PROJECT: Delegation – Agricultural Recreation Committee		
PRESENTATION DATE: November 22, 2016		
DEPARTMENT: Ag. Services and Landcare	**WRITTEN BY:** Matt Martinson	**REVIEWED BY:** Ron Leaf
BUDGET IMPLICATION: ☒ N/A ☐ Funded by Dept. ☐ Reallocation		
LEGISLATIVE DIRECTION: ☐None ☐ Provincial Legislation (cite) ☐ County Bylaw or Policy (cite)		
STRATEGIC PLAN THEME: Community Well-Being	**PRIORITY AREA:** Sustain the recreation, cultural and quality of life needs	**STRATEGIES:** 3.1.2 – Continue to evaluate, plan and support the recreation cultural and leisure needs within Clearwater County.
ATTACHMENT(S): Ag Rec Facility Feasibility Study.		
RECOMMENDATION: 1) That Council receives the Ag Rec Committee's report for information. **2)** That Council confirms the Airport Lands (NE3 40-7 W5) as the potential site for a future Ag. Rec facility should the project move forward.		

BACKGROUND:

The Agricultural Recreation Committee (ARC) has recently met and discussed the next steps necessary for the potential development of an Ag. Rec Facility (ARF). The committee has finished the mandate given to it by Council which was completing a feasibility study for a potential future facility.   This feasibility study was presented to Council January 27th 2015 and has been available on our website since then. The study covers research and consultation, identification of facility components and amenities along with site selection criteria. Also included in the study was a high level projection of capital and operating costs. The study recommends a phased approach with the first phase including the anchor component of a 150 ' x 200 ' indoor riding arena to meet basic community and event needs along with supporting amenities. Phase two includes a banquet / exhibition facility along with other additional amenities to increase the event hosting capacity and better meet community needs.

During the meeting the committee discussed continuing its work towards the investigation and development of a facility by further engaging Ag recreation stakeholders within Clearwater County many of which have close ties to the Rocky Ag Society. The main purpose of this

engagement will be to measure support for the project its self, as well as the capacity of these groups to assist with project financing.

Confirmation of a potential future site for an ARF has not being provided to the Rocky Ag. Society to date. The County property near the Airport (NE3 40-7 W5) currently meets all of the criteria set out in the ARC's feasibility study. Confirming the potential location for an ARF would assist the Ag Society as it works to engage its stakeholders.

Agricultural Recreation Facility Feasibility Study

March 11, 2015 / FINAL DRAFT

Executive Summary

Rocky Mountain House and Clearwater County are part of a growing and economically vibrant region with a strong agricultural history and culture. Based on perceived community demand and previous planning exercises, the Agricultural Recreation Facility Feasibility Study was initiated in order to further assess the need, market potential, viability and financial implications of facility development. The project was conducted by RC Strategies with guidance from a steering committee consisting of individuals from a cross-section of community stakeholders and organizations.

Public and stakeholder consultation for the feasibility study demonstrated that strong support exists within the agricultural and business community for facility development. A stakeholder group questionnaire was fielded to a variety of organizations in the region, with 18 groups provided a completed response. The majority of groups (61%) indicated that current facilities in the region are not adequate to meet their organization's needs; with 79% indicated that they believed there was a need for a new agricultural recreation facility in Rocky Mountain House. The component / amenity most desired by the groups was an indoor riding arena. In-person interviews with a number of stakeholders also revealed strong support for a facility. Stakeholders expressed that a new facility could enhance the capacity of groups in the region and provide the broader community and region with numerous benefits.

Market and trends research further reflects the potential and benefits of developing a new agricultural recreation facility in the Rocky Mountain House area. While a number of facilities exist or are being developed in central Alberta, the majority are in closer proximity to the Queen Elizabeth II (QE2) Highway Corridor than Rocky Mountain House. The continued growth and economic prosperity of the region further provides the potential to capitalize on both existing and future program and event demand.

A facility program (components and amenities) was developed for a potential facility based on the research and consultation that was conducted. In order to most efficiently meet community need while planning for future growth, a phased approach was adopted which can be explained as follows:

Phase 1: Development of a new indoor agricultural recreation facility (indoor riding arena) to meet basic community program and event need.

Phase 2: Addition of a banquet / exhibition facility in order to increase the event hosting capacity of the site and better meet community need. Existing indoor riding arena (Phase 1 development) also enhanced with additional amenities (e.g. increased spectator seating, box stalls).

Capital cost estimates indicate that the cost of developing the facility is expected to be in the order of $12.031 million for Phase 1 and $10.071 for Phase 2. It should however be noted that these facilities often have the potential to be developed with, or adjacent to, other community infrastructure. Should this approach be undertaken in Clearwater County, efficiencies may be possible through the sharing of certain amenities and spaces (e.g. parking, camping) and thus lowering the overall capital cost. Preliminary operating cost estimates have also been developed based on projected usage levels. These projections anticipate that an operating subsidy and/or partnerships will be required.

Should the key stakeholders move forward with the project, the capital funding and operating model will need to be clarified and finalized. A site for the potential facility will also need to be acquired. Provided in the feasibility study is a site selection criteria model which may be helpful in adjudicating future sites. Once these steps have been completed; detailed design, business planning and construction can occur.

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Project Background

The desire for a public multi-purpose agricultural recreation facility in the Rocky Mountain House and Clearwater County region is long standing. The need for such a facility has been identified by various community groups and residents and a number of previous initiatives have explored the possibility of constructing. However despite these past initiatives facility development has not come to fruition. Presented in this section is an overview of he project background and the process used to develop the study.

In February 2014 RC Strategies, an Alberta based community and wellness infrastructure planning company, was retained to develop a feasibility study on a multi-purpose agricultural recreation facility in the Rocky Mountain House and Clearwater County area. The project was guided by the Rocky Mountain House Agricultural Society with support from Clearwater County. The objective of the project was to further explore the community need for, and feasibility of, developing a new multi-purpose agricultural recreation facility. Ultimately the study will provide the County and community stakeholders with the necessary information to make future decisions on the potential development of a multi-purpose agricultural recreation facility.

Identified early in the project was the need to base the study in sound stakeholder engagement and research, leading to the development of a draft facility program (outline of facility components and amenities). The draft facility program can then be used to develop capital and operating cost estimates for the potential facility. The process used to develop the study is explained in the following graphic.

Phase 1: **Research & Consultation**	Phase 2: **Facility Program & Site Requirements**	Phase 3: **Cost Analysys & Funding Strategy**	Phase 4: **Study Finalization**
• Market Research • Stakeholder Interviews • Group Survey • Trends Review	• Development of Draft & Finalized Facility Program • Determine Site Criteria • Facility Concept Plans	• Capital Cost Estimate • Operating Cost Estimate • Funding Strategy • Risk Analysis	• Develop & Present the Draft Study • Finalize Study

2

Community Context

Rocky Mountain House is located in west-central Alberta near the confluence of the Clearwater and North Saskatchewan rivers. With an estimated trading area of 21,000[1], the area remains an important service hub for the region as well as a staging area for a multitude of recreational activities that take place in Alberta's "West Country". Presented in this following section is a further overview of the community including population and demographics.

Economic activity in the region continues to be largely driven by the natural resource sector which includes a number of oil and gas, forestry and agricultural operations. Area residents and visitors have access to a variety of recreational and leisure opportunities. Crimson Lake Provincial Park and Cow Lake Natural Area are located within minutes of Rocky Mountain House and remain popular spots for a variety of recreational activities. The region's location also provides quick and convenient access to an abundance of trails and natural areas to the west of Rocky Mountain House.

Located within Rocky Mountain House are a variety of sport, recreation and cultural facilities which include a twin arena complex, swimming pool, sports fields, curling rink and the Community Centre. Outdoor agricultural facilities in Rocky Mountain House are available at the North Saskatchewan River Park. The grounds at the North Saskatchewan River Park host the Rocky Rodeo (June) and the Battle of the Rockies WPCA Chuckwagon event (August). During the summer months the arena surfaces in Rocky Mountain House are converted to a dirt floor to provide agricultural based groups with a space to offer programs. The Kurt Browning Arena in Caroline is also used for agricultural activities.

The ongoing popularity of "agri-recreation" activities and pursuits is further reflected by the abundance of organizations in the area that offer events and programs. The region is home to a number of 4-H clubs, equine groups and breed associations that use a variety of public and private spaces in the region for their programs and events. Many of these organizations receive support from the Rocky Mountain House Agricultural Society. The Society is one the oldest in the province and continues to play an important advocacy role in the community.

1   Town of Rocky Mountain House website, http://www.rockymtnhouse.com/index.aspx?NID=135

A. Population & Demographics [2]

Summarized in the adjacent chart is an overview of the population characteristics of the Town of Rocky Mountain House, Clearwater County and the Province of Alberta. As reflected in the chart, Rocky Mountain House and Clearwater County experienced modest growth from 2006 to 2011. From 2001 to 2006 the Town of Rocky Mountain House experienced more rapid growth consistent with the overall average of the province. The median age of Rocky Mountain House (35.0) is slightly younger than the provincial average (36.5), while Clearwater County's median age is older (42.4).

The positive growth rate experienced in Clearwater County, while modest, is contrasting from the population changes being experienced in surrounding rural municipalities. From 2006 to 2011 Lacombe County (-0.8%) and Red Deer County (-1.6%) experienced population decreases, while Mountain View County (0.4%) experienced only a fractional population increase.

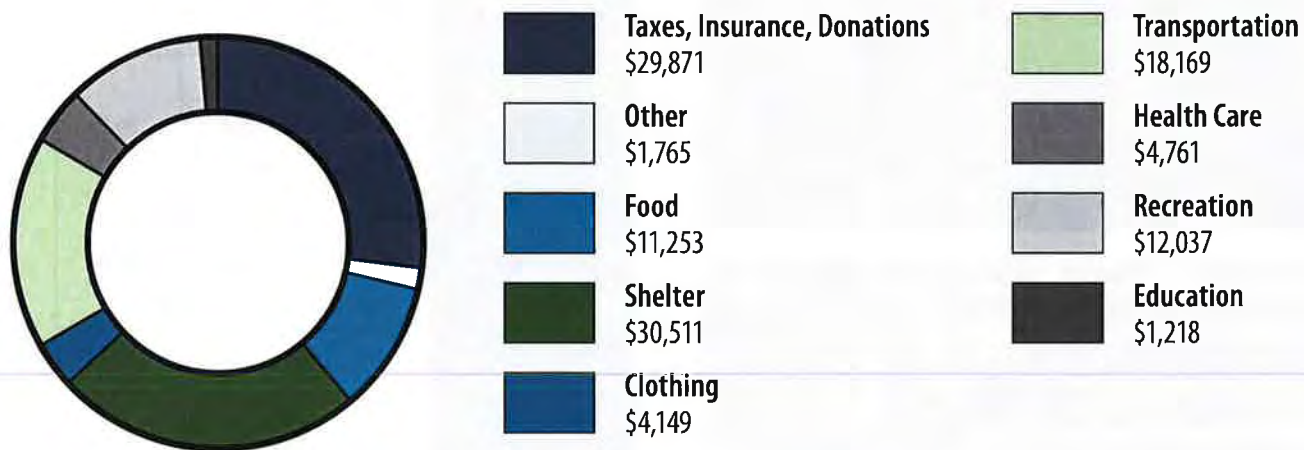|	CLEARWATER COUNTY	TOWN OF ROCKY MOUNTAIN HOUSE	PROVINCE OF ALBERTA
POPULATION (2011)	12,278	6,935	3,645,257
GROWTH 2006 – 2011 (%)	3.8%	0.9%	10.8%
GROWTH 2001 – 2006 (%)	2.8%	10.7%	10.6%
MEDIAN AGE	42.4	35.0	36.5
% POPULATION AGED <19	26.4%	27.4%	25.3%
% POPULATION AGED 20 – 59	53.5%	54.8%	58.5%
% POPULATION AGED 60+	20.1%	17.7%	16.1%

2 Data from Statistics Canada, 2011 Census of the Population unless otherwise specified.

Available household income data from the 2006 Census (last available) reflects that earnings are consistent in Clearwater County and Rocky Mountain House when compared to provincial figures. In 2006 the median household income was $72,449 in the Town and $66,819 in the County (provincial average- $73,823).

A 2013 Economic Indicators report completed for Rocky Mountain House further identified a number of pertinent household income and spending characteristics. The following graph provides an overview of current household spending characteristics of residents in Rocky Mountain House. As reflected in the graph households are spending an average of $12,037 per year on recreation related expenses.

Average Household Expenditures

|		
Taxes, Insurance, Donations $29,871		**Transportation** $18,169
Other $1,765		**Health Care** $4,761
Food $11,253		**Recreation** $12,037
Shelter $30,511		**Education** $1,218
Clothing $4,149		

Rocky Mountain House Economic Indicators Report 2012 (completed by the Central Alberta Economic Partnership).

B. Population Growth Projections

Fifteen year population growth projections were developed for the Town of Rocky Mountain House and Clearwater County and are presented in the following graphs. The growth projections anticipate that the combined population of the Town of Rocky Mountain House and Clearwater County could be between 20,736 and 24,221 in 2029.

Town of Rocky Mountain House Growth Projections
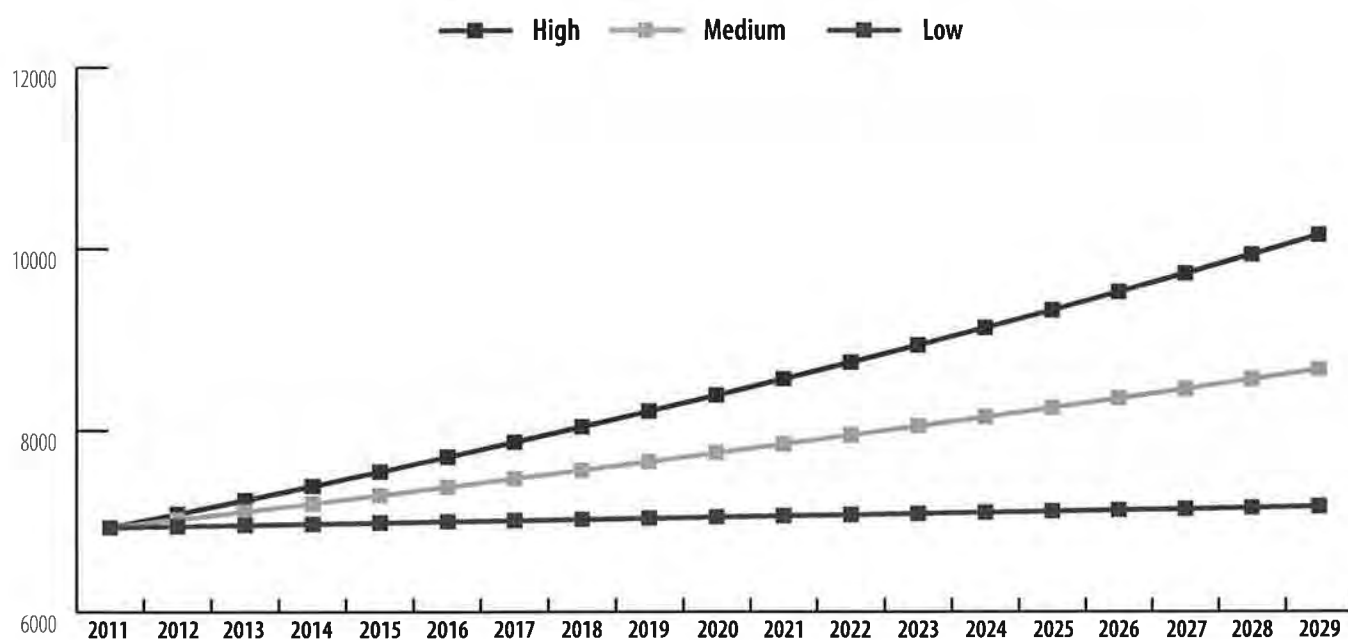
The low growth scenario (0.18% annual growth) for Rocky Mountain House is based on the annual growth rate as recorded by Census data from 2006 to 2011. This scenario would result in a 2029 population of 7,161 in the town. The high growth scenario (2.14% annual growth) was developed using the annual growth recorded in the town from 2001 to 2006. This scenario would see the population of Rocky Mountain House increase to 10,150 in 2029.

The medium growth scenario (1.25% annual growth) was developed to reflect a mid-point between the high and low scenarios and would result in a population of 8,670 in 2029.

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Clearwater County Growth Projections
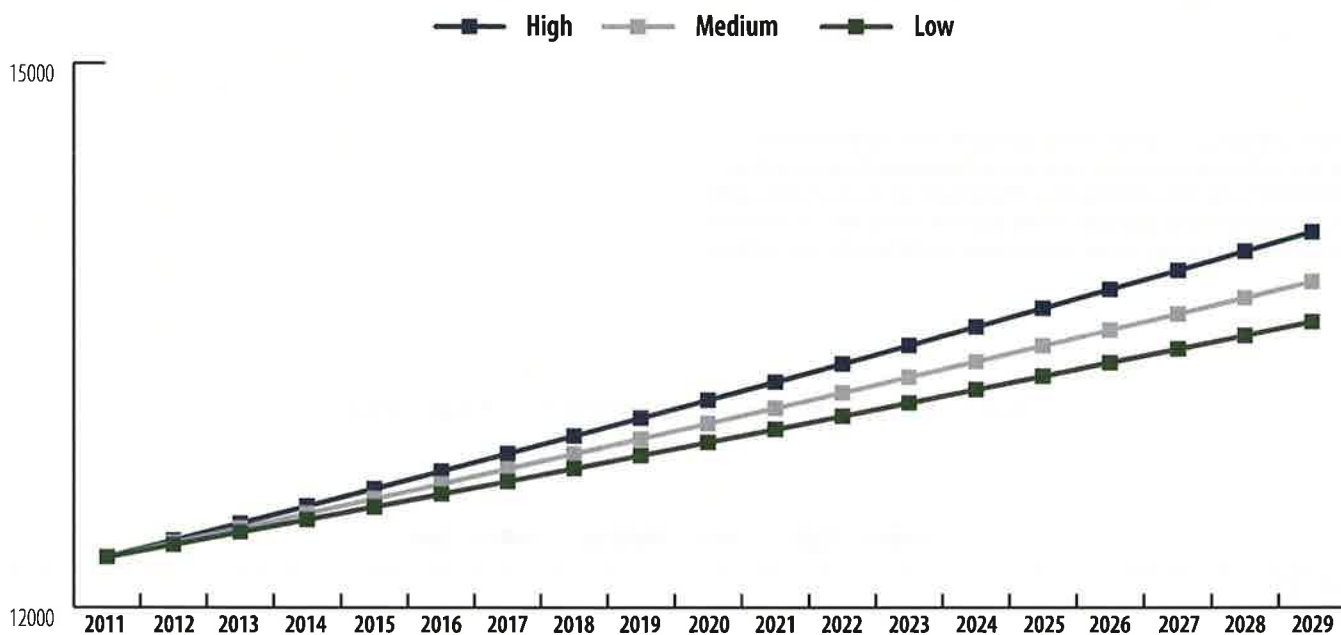
The low growth scenario (0.56% annual growth) for Clearwater County anticipates that the 2029 population could be 13,676. This scenario was developed using the average growth rate experienced in the County between 2001 and 2006. The high growth scenario (0.76% annual growth) reflects the growth experienced in the County from 2006 to 2011 and would result in a 2029 population of 14,071.

The medium growth scenario (0.65% annual growth) reflects a mid-point between the high and low growth scenarios. This scenario would result in a 2029 population of 13,797 residents in the County.

3
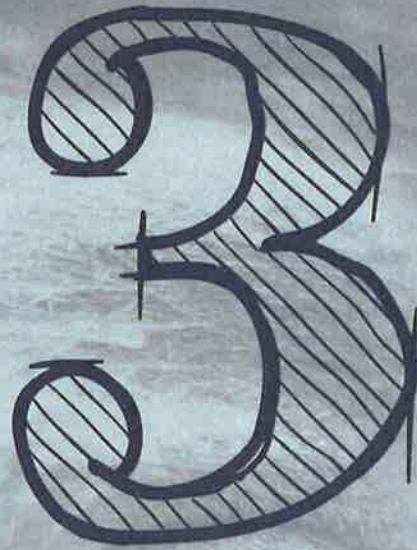
Market Research

The following section presents market research information that may be pertinent to the development of a new multi-purpose agricultural recreation facility in Clearwater County. Included is an overview of the current provision of indoor agri-recreation facilities. A brief synopsis is also provided on private and public facility types that are being utilized across the region by groups and individuals for agri-recreation activities.

A. Indoor Agri-Recreation Facilities

As illustrated in the following map, there are 8 "public" indoor agri-recreation facilities within approximately 150 km of Rocky Mountain House. These facilities are primarily operated by not for profit organizations with support from local municipalities. The Cal-Nash Trucking Ag Event Centre in Ponoka is operated by an entity which includes representation from both municipalities (Town of Ponoka and Ponoka County), the Ponoka Agricultural Society and the Ponoka Sport and Stampede Association.

A new facility is currently being developed in Rimbey and one other is also being contemplated in Drayton Valley. These facilities will add to the regional supply of indoor agri-recreation facilities and are likely to further increase the level of competition among facilities for events. Located within Clearwater County are a handful of public and private arenas that serve agricultural groups and events. These include the Rocky Mountain House and Kurt Browning Arenas, which are used during the non-ce season. The Eckville Arena, located just outside the County boundaries, is also utilized.

Facilities in the region vary from major event hosting facilities, such as Westerner Park (Red Deer) and the Cal-Nash Trucking Ag Event Centre (Ponoka), to smaller, more community-based facilities. The target market and mandate of each facility directly correlates to the amenities and operations of each. Major event facilities are often equipped with support amenities such as animal tabling (box stalls), banquet facilities, and loasing areas. These facilities are usually located along major roadways in close proximity to accommodations.

The following chart provides an overview of the commercial rates being charged at five indoor agri-recreation facilities in the region. Many of these facilities offer reduced rates to community groups for programs and / or events.

| FACILITY	DAY RATE	HOURLY RATE	DROP-IN RIDING	STABLING (PER DAY)
CALNASH TRUCKING AG EVENT CENTRE (PONOKA)	$1,200	$120	$20	$35
THORSBY HAYMAKER CENTRE	$550	$55	N / A	$20
OLDS (COW PALACE)	$900	$100	N / A	$40
COCHRANE	$525	$65	$20	$35
STETTLER	$400	$60	N / A	$20
AVERAGE	**$715**	**$80**	**$20**	**$30**

B. Other Facilities

Agriculturally focused groups and organizations currently utilize a variety of other facilities and spaces across the region for their activities. While these facilities are valued and appreciated, they often have limiting factors which impact the ability of agri-recreation groups to deliver programs and events in these spaces. Identified as follows is an overview of these facility types as well as summary statements that characterize the current utilization of these facilities.

- Private indoor riding arenas
  - » Numerous facilities of varying sizes and amenities in the region.
  - » Often offered to not for profit groups at a reduced rate.
  - » Limitations include a lack of support amenities (e.g. parking, meeting space) and availability.
  - » Liability issues are increasingly preventing many private operators from offering their facilities to groups.
- Community halls
  - » Used by groups for meetings, social functions and educational purposes.
  - » Over 20 community halls in the region, majority with capacities <200.
  - » Existing halls in the region have varying levels of support amenities.
  - » Many community halls in rural areas are in declining condition.
- Indoor ice arenas
  - » The Town of Rocky Mountain House currently puts a dirt floor in the ice arenas during the summer months to accommodate agri-recreation programs and events.
  - » The Kurt Browning Arena in Caroline is used during the non-ice season for agricultural activities.
  - » Other local communities (e.g. Eckville*, Kootenay) also use indoor ice arenas for agri-recreation events and programs during non-ice seasons.
    - * Eckville is located outside the County boundaries.
  - » The installation of footing in an indoor ice arena can be accompanied by a number of maintenance and user challenges.

4
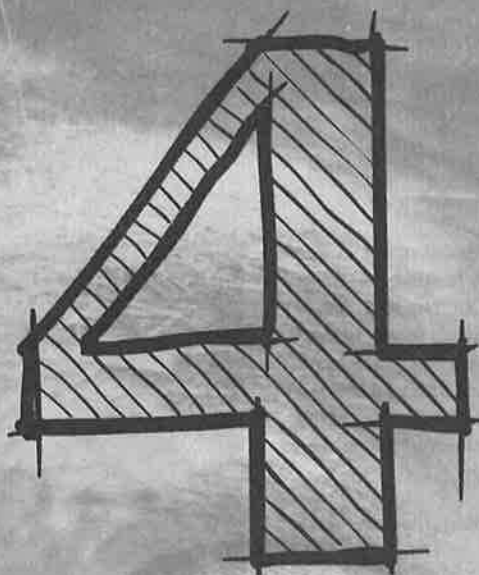
Trends

The following section provides an overview of trends in agriculture and "agri-recreation". These trends are based on available data from a number of sources as well as best practices observed at a regional, provincial and national level. A thorough understanding and consideration of these trends can help ensure that future infrastructure and programming is efficient, focused and relevant in order to best meets community needs.

A. Trends in Agriculture

Data available from the 2011 Statistics Canada Census of Agriculture suggests that there is a continued trend towards fewer, but larger and more profitable, farming operations. From 2006 to 2011, Alberta experienced a 12.5% decrease in the total number of farms, however farms with $500,000 or more in total gross farm receipts increased by 18%. In total, 10.3% of farms in Alberta accounted for 70.6% of all gross farm receipts. The average farm size in Alberta also increased by approximately 10% (1,055 acres to 1,168 acres) between 2006 and 2011.

Identified below are a number of additional findings from the 2011 Statistics Canada Census of Agriculture:

- Alberta accounts for 21% of all farms in Canada, and 31.5% of total farm area
- Alberta continues to report the largest cattle herd in the country in 2011 (39.9% of national inventory)
- However Alberta experienced a 19.9% decrease in total cattle inventories, declining from 6.3 million head in 2006 to 5.1 million head in 2011 (national decrease was 18.9% from 2006 to 2011)
- The number of persons involved in farm operations (62,050) decreased by 13.4% in Alberta from 2006 to 2011
- The average age of farm operators in Alberta is 54.5 years of age, up from 52.2 years of age in 2006
- 52% of farm operators have an off-farm job or business
- Farm operators aged 35 and under were more likely to have a full-time job off the farm than older operators (32.8% under 35 years of age, 27.9% between 35-54 years of age, 12.8% aged 55 and over)
- Cropland on Alberta farms increased from 45.6% to 47.7% between 2006 and 2011
- Over one-quarter (29.6%) of Alberta farms employed paid labour in 2010

B. Participation Levels

EQUINE ACTIVITIES

The 2008 Alberta Recreation Survey found that horseback riding / trail riding was among the top ten most frequently participated in outdoor activities among Albertans, with 7.9% of respondents having participated at least once in the previous year. If this figure is extrapolated to the combined population of the Town of Rocky Mountain House and Clearwater County it can be estimated that 1,518 regional residents participated in horseback riding in the previous year.

Membership information from the Alberta Equine Federation (AEF), the governing body for sanctioned equine activities in Alberta, further reflects the popularity of recreation based equine events and competitions. From 2002 to 2012, the membership of the AEF doubled from 7,000 to over 15,000 members. The majority (84%) of the AEF membership are classified as 'recreational' participants, with 16% classified as 'sport' participants. Participation levels are also highest among females and youth. In 2012, 69% of the AEF membership was comprised of female members and 67% of members were junior aged.

A survey undertaken for a 2003 study commissioned by the Horse Industry of Alberta[3] found that 76% of respondents identified that their primary focus of interest was sport/recreational in nature, while 24% identified "business" as their primary focus of interest. The top three primary interests identified by respondents were sport/ recreational riding (68.2%), breeding (46.5%) and trail riding (43.6%).

Another growing sector in recreational equine is the popularity of pony clubs. The Canadian Pony Club includes approximately 4,500 individual members and 175 branch clubs. Many Pony Clubs operate with a strong mandate geared towards attracting new members, especially youth, to riding and equestrian disciplines.

EVENTS

For many individuals, participation in agri-recreation and related activities occurs through events. This participation can be as a spectator or attendee, active participant or volunteer. In 2011, Agricultural Societies in Alberta reported that they hosted a total of 991 events, with 141 of 289 registered Societies hosting at least one event in the previous year. It was reported that over 1.5 million people attended these events, an increase of 43% from previous data collected in 1992. Volunteers played a significant role in the planning and execution of these events. Societies reported that 154,226 volunteer hours (24% of total hours) were dedicated to community and rural events and 127,446 volunteer hours (19% of total hour) were dedicated to sport and rodeo events.[4]

Survey findings from the Horse Industry of Alberta's 2003 study also identified involvement levels in a number of event related agri-recreation disciplines and activities.

- Breed competitions/horse shows (24.3% identified as a primary sport/recreation interest)
- Dressage (13.0% identified as a primary sport/recreation interest)
- Hunter/Jumper (12.6% identified as a primary sport/recreation interest)
- Barrel racing (12.2% identified as a primary sport/recreation interest)
- Reining (10.6% identified as a primary sport/recreation interest)
- Rodeo (9.7% identified as a primary sport/recreation interest)
- Roping/team roping (5.8% identified as a primary sport/ recreation interest)

4-H PARTICIPATION

4-H Canada, a youth development organization with a focus on rural skill development, provided programs to over 24,000 Canadian youth in 2012/13. Alberta remains the most active 4-H province, accounting for nearly a quarter (24.9%) of all 4-H participation in Canada. While participation remains strong in many communities, overall participation in 4-H has decreased since 2008/09 by approximately 9% at both the national and provincial level. The number of active clubs in Alberta also decreased from 399 in 2008/09 to 369 in 2012/13.

The highest proportion (41%) of 4-H projects undertaken by Alberta participants in 2012/13 involved Beef, followed by Horse (24%) and Dog (6%). In total, Alberta youth participated in 28 different types of 4-H projects which included food sciences, outdoor living, sheep / lamb raising, crafts and veterinary studies. Females continue to represent the majority (60% provincially, 61% nationally) of participants. The average age of participants is 14 years of age in Alberta and 15 years of age nationally.

C. Economic Benefits

Agri-recreation events and activities contribute to local, regional and national economies by generating both local and tourism related spending. The Pro Rodeo Association of Canada estimates that the Canadian Finals Rodeo, held annually in Edmonton, generates an economic impact of more than $50 million dollars for the local economy. It is also estimated that professional rodeos in North America contribute over $30 million annually to charitable organizations.[5]

Community groups and organizations benefit their local and regional economies by hosting events, providing employment for residents and operating or renting facilities. Using methodology and prior research conducted by Travel Alberta, it is estimated that over $200 million dollars is spent annually in Alberta by attendees at events staged by Agricultural Societies and their facility tenants. Societies across the province also reported that over $36 million dollars (90% of their total annual expenditures) were spent locally or regionally.[6]

5   Pro Rodeo Canada website, http://www.rodeocanada.com/

6   Alberta Association of Agricultural Societies, Community Benefits, Economic Stimulation and Sustainability (2012).

D. Service Delivery & Programming Trends

RURAL EDUCATION

Changing demographics and a continuing population shift from rural to urban areas has forced many agri-recreation focused organizations and facilities to adapt in order to continue attracting program participants, event spectators and to maintain overall interest in rural living and recreational pursuits. Municipalities and not for profit organizations are placing an increased priority on offering programs and events with a rural education component. Doing so can help connect residents, especially youth, to rural activities. In addition, many program providers and facilities in rural communities located in close proximity to larger urban centres have found that there exists a market amongst 'urbanites' that are looking to escape the city and participate in agri-recreation programs and events.

Educational displays, food to fork shows, and the creation of introductory competitions are examples of rural education strategies that many agri-recreation facilities and organizations have found to be successful. Rural municipalities and not for profit program providers such as 4-H have also had to diversify their program and event offerings in order to continue attracting youth. Many annual events organized by rural municipalities or not for profit group now encompass activity booths and hands-on opportunities for youth to interact with animals or learn about food production.

There also exists a growing number of organizations with a specific focus on rural education and sustainability. One such example is Green Hectares, a Strathcona County based organization which offers a number of resources and supports to entrepreneurs within the agricultural industry. Through these offerings, Green Hectares strives to attract young people to agriculture and create vibrant and sustainable rural communities.

PROVIDING STRUCTURE & UNSTRUCTURED OPPORTUNITIES

A trend observed broadly across recreation and leisure is the increasing demand for unstructured or "spontaneous use" opportunities. People are seeking individualized, informal pursuits that can be done alone or in small groups and at flexible times. This trend appears to be especially relevant to Albertan's who average the lowest amount of average leisure time per day nationally.[7]

Examples of unstructured opportunities could include providing open times for riding at an indoor facility or publically accessible equine trails adjacent to a facility. However this does not eliminate the need for venues that accommodate structured activities and the stakeholder groups that utilize them. Instead, this trend suggests that both types of users are important to consider in order to most adequately meet community needs.


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7   Statistics Canada (2005).

PARTNERSHIPS

Important and often crucial to the provision of agri-recreation opportunities in most communities are partnerships. These partnerships can take shape in a variety of forms and include municipalities, not profit organizations and the private sector. Partnerships between municipalities and not for profit organizations often involve monetary contributions such as grants. By providing grants to not for profit organizations, municipal and provincial levels of government can ensure that programs, events and facilities are available to residents in an efficient and often lower cost manner than if government were to directly offer the service. In 2011, Agricultural Societies in Alberta received over 33% ($14,252,081) of their revenues from government grants.[8]

Many municipalities also provide community groups with no or low cost access to facilities, meetings rooms and human resources. Offering groups these resources can help build good will, and ensure that community groups have the proper support and capacity to plan and coordinate events and programs that can be enjoyed by residents and attract visitors.

Recognizing the economic impact that agri-recreation events and activities can have on a community, the private sector is also an important partner for many not for profit groups and municipalities. These partnerships can involve sponsorships, donations and collaboration on promotions and marketing. In 2011, Agricultural Societies in Alberta procured 11% of total revenues ($4,655,897) from donations, sponsorship and other fundraising activities; a significant proportion of which can be attributed to the private sector.
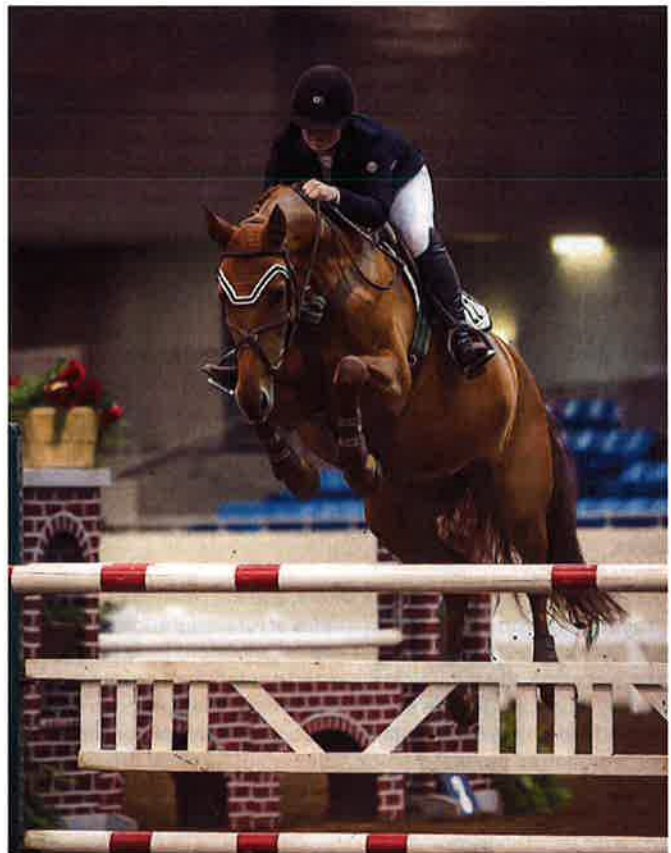
8   Alberta Association of Agricultural Societies, Community Benefits, Economic Stimulation and Sustainability (2012).

E. Trends in Infrastructure

MULTI-PURPOSE SPACES

Increasingly, community recreation and leisure community facilities are being designed to accommodate multiple activities and to encompass a host of different components. The benefits of designing multi-functional spaces include the opportunity to create operational efficiencies, attract a wide spectrum of users, and procure multiple sources of revenue. This trend is especially pertinent in the development and operations of public agri-recreation facilities such as indoor riding arenas. In order to justify public investment, there facilities are being required to serve a variety of different user groups and agricultural disciplines.

A number of design considerations can help agri-recreation facilities achieve the mandate of multi-functionality. Ensuring that adequate load in/out access and proper (preferably covered) storage exists for multiple types of footings can help a facility attract and retain a wide spectrum of programs and events. Providing on-site amenities such as program/meeting rooms, wash bays, parking, practice areas, storage, temporary event stabling, camping and social gathering spaces can further help ensure that a facility is multi-purpose in nature.

While many multi-purpose agricultural facilities are initially conceived to primarily service traditional agricultural activities such as equine riding, livestock shows and indoor rodeos; the long term viability of many facilities is largely dependent on attracting additional user groups and events. Trade shows, tractor pulls, dog agility programs and events, archery and a host of other activities are held at many multi-purpose agri-recreation facilities. Designing spaces that are easily re-configured and have multiple layout options can help attract and accommodate a multitude of activities.

INTEGRATING INDOOR & OUTDOOR ENVIRONMENTS

A new concept observed broadly across community recreation infrastructure planning is to ensure that the indoor environment interacts seamlessly with the outdoor environment. Although there are a number of operational issues that need to be considered when combining indoor and outdoor environments (e.g. cleanliness, controlled access), this concept can result in a number of operational and user benefits. These benefits can include creating community hubs, maximizing usage of available land and encouraging full season usage of a site. Operational efficiencies can also be obtained through this approach as support amenities (e.g. storage and mechanical) and staff can often be shared.

Within agri-recreation, it is common for indoor riding arena's to be located adjacent to outdoor facilities such as rodeo grounds, practice areas and camping facilities. In some cases, agri-recreation sites encompass or are linked to equine nature trails and other natural areas. Creating these linkages and synergies can help ensure that a site is used by a multitude of agricultural enthusiasts.

PLANNING FOR FUTURE EXPANDABILITY

As communities grow and interests evolve, it may be necessary to expand or re-purpose recreation infrastructure. Planning and designing recreation infrastructure in such a manner that it can accommodate future expansion has the potential to result in long term cost savings and the most efficient use of land resources. When initially constructing facilities, it is important to ensure that adequate amounts of adjacent land are available for expansion and that the facilities themselves are designed in such a manner that they can be easily added on to.

While ideally all desired facilities and amenities would be developed simultaneously, financial realities often dictate that infrastructure is developed through a phased approach over a period of time. This approach often requires project developers and stakeholders to prioritize community needs and weigh the costs/benefits of developing specific facilities or amenities. When developing infrastructure through a phased approached, it is important to ensure that the design and site layout provides flexibility as community needs and circumstances may change over time.

Stakeholder Consultation

Engaging community and regional stakeholders was identified as a critical component to the development of the Agricultural Recreation Facility Feasibility Study. Feedback from these stakeholders provided the consulting team with the opportunity to clarify community needs for facility development and identify required facility program components and amenities. To ensure a wide spectrum of groups and individuals were engaged a stakeholder group questionnaire and one on one interviews were both utilized. The findings from this consultation are presented in the following section.

A. Stakeholder Group Questionnaire

A stakeholder group questionnaire was distributed to over 75 organizations in Rocky Mountain House and Clearwater County. Groups were provided with a web link to an online version of the survey as well as the option of completing a PDF version and returning it by mail, fax or email (see Appendix A for the survey tool). In total 23 responses were provided by organizations representing a variety of different agricultural and community interests (see Appendix B for a complete list of participating groups).
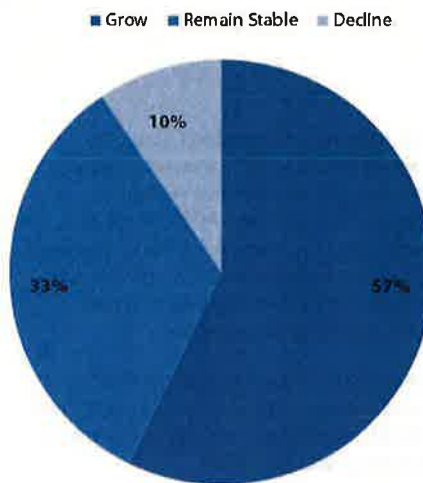
To start the survey respondents were asked a number of questions pertaining to the activities and current membership and participant base of their organization. When asked about the age composition of their organizations the following was reported:

- 6 groups indicated that they have members / participants / clients that are preschool (age 0 - 5) aged.
- 16 groups indicated that they have members / participants / clients that are youth (aged 6 -12).
- 16 groups indicated that they have members / participants / clients that are teens (aged 13 – 17).
- 21 groups indicated that they have members / participants / clients that are adults (aged 19 – 59).
- 11 groups indicated that they have members / participants / clients that are seniors (aged 60+).
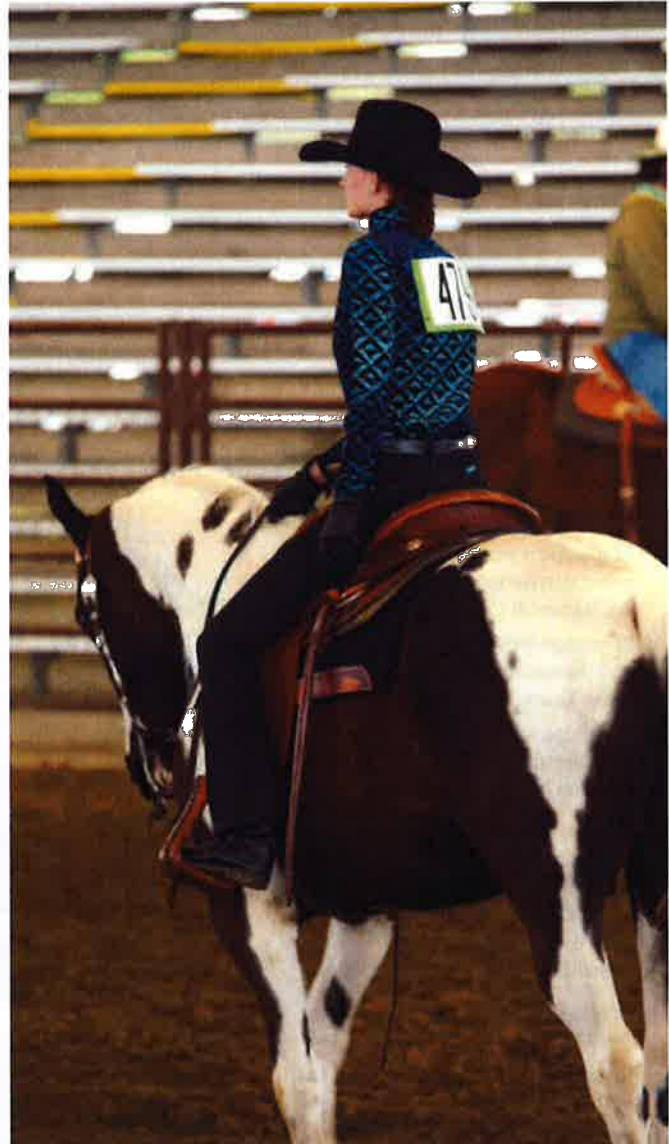
Over the next couple years, what are your expectations
for participant / member / client numbers?

Next, respondents were asked about their future expectations for members / participate / client numbers. As illustrated in the following graph, the majority (57%) of group respondents indicated that they expect to grow in the coming years.

■ Grow   ■ Remain Stable   ■ Decline

Group survey respondents were asked to estimate of the residency of their members / participants / clients.

- 22 groups reported that they have members/participants/clients that live in Clearwater County.
- 13 groups reported that they have members/participants/clients that live in the Town of Rocky Mountain House.
- 15 groups reported that they have members/participants/clients that live in "other" municipalities.

To get a sense of the facilities currently being utilized by groups, respondents were next asked to identify up to five facilities that there organizations use the most. In total 25 different facilities were cited. The three facilities with the most mentions were:

- Private facilities in the region (8 mentions)
- Town of Rocky Mountain House Twin Arenas (7 mentions)
- North Saskatchewan River Park Rodeo Grounds (6 mentions)

Are the current facilities in the region adequate
to meet your organization's needs?
(18 Responses)

Group questionnaire respondents were next asked if the current facilities in the region were adequate to meet their organization's needs. As reflected in the following graph the majority (61%) of respondents indicated that the current facilities did not meet their organization's needs.

Respondents were next provided with space to further explain why the currentl facilities did not meet their organization's needs. In total fifteen comments were provided. Common themes from the comments are as follows:

- Lack of space and support amenities.
- Deteriorating conditions at existing facilities that they use.
- Ice arenas only available during the summer months.
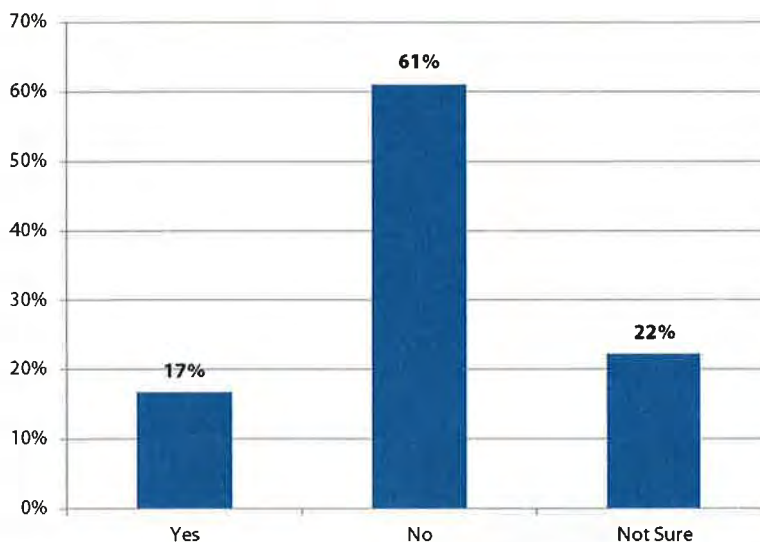
Do you think there is a need for a new agricultural
recreation facility in Rocky Mountain House?
(19 Responses)

Group survey respondents were asked if their organization thinks there is a need for a new agricultural recreation facility to be developed in the Rocky Mountain House area. As illustrated in the following graph over three-quarters (79%) of respondents thought that new development was needed.
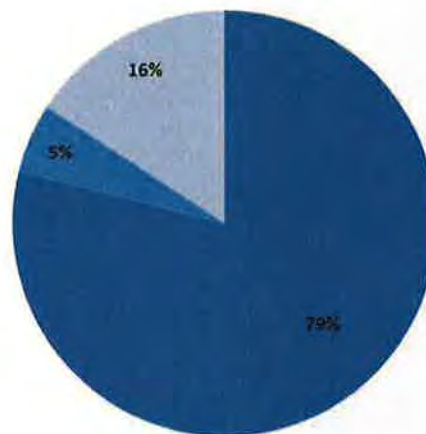
Group representatives that were supportive or unsure about the development of a new agricultural recreation facility were next provided with a list of potential components and amenities. From the list, respondents were asked to select up to 5 components / amenities that should be included in a new agricultural recreation facility. As illustrated in the following graph, 89% of group respondents in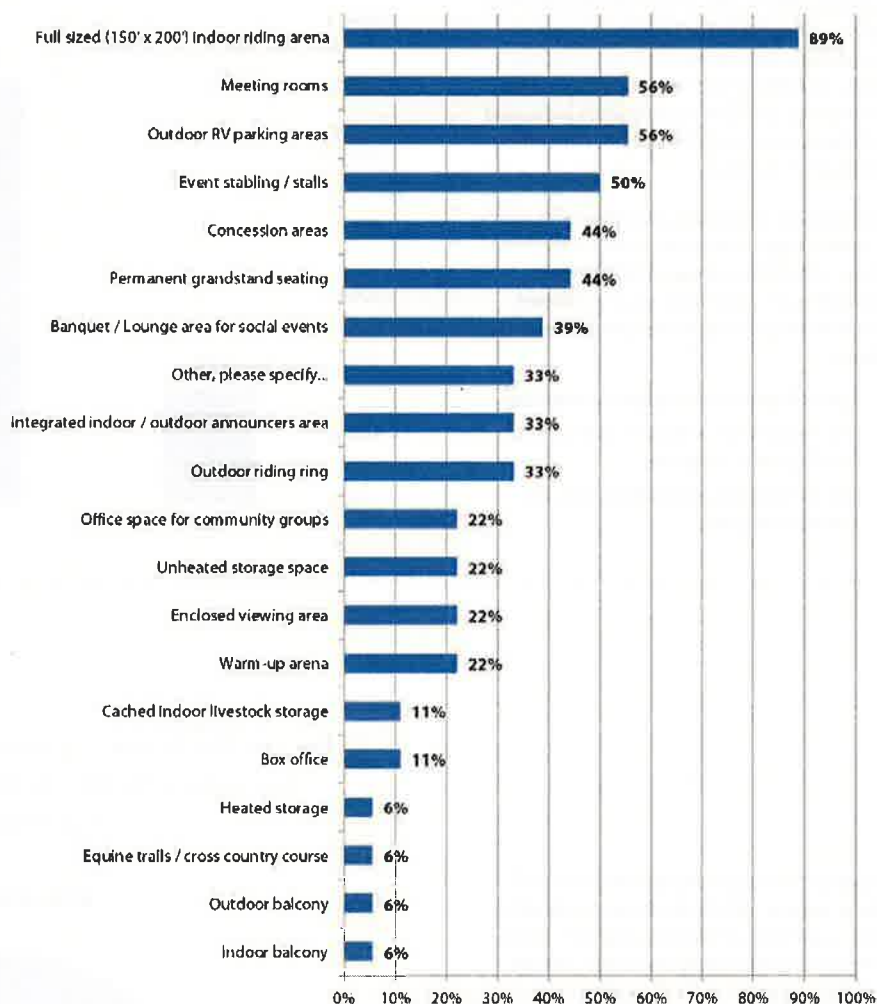dicated that a full sized indoor riding arena was needed. Over half of respondents also indicated that meeting rooms, outdoor RV parking areas and event stabling / stalls were needed.

Component	%
Full sized (150' x 200') indoor riding arena	89%
Meeting rooms	56%
Outdoor RV parking areas	56%
Event stabling / stalls	50%
Concession areas	44%
Permanent grandstand seating	44%
Banquet / Lounge area for social events	39%
Other, please specify...	33%
Integrated indoor / outdoor announcers area	33%
Outdoor riding ring	33%
Office space for community groups	22%
Unheated storage space	22%
Enclosed viewing area	22%
Warm-up arena	22%
Cached indoor livestock storage	11%
Box office	11%
Heated storage	6%
Equine trails / cross country course	6%
Outdoor balcony	6%
Indoor balcony	6%

Would your organization use a new agricultural recreation facility should one be built in the Rocky Mountain House?

Respondents were asked if their organization would use a new agricultural recreation facility should one be built in the Rocky Mountain House area. As reflected in the following graph, 68% of respondents indicated that there organization would use a new facility if available.
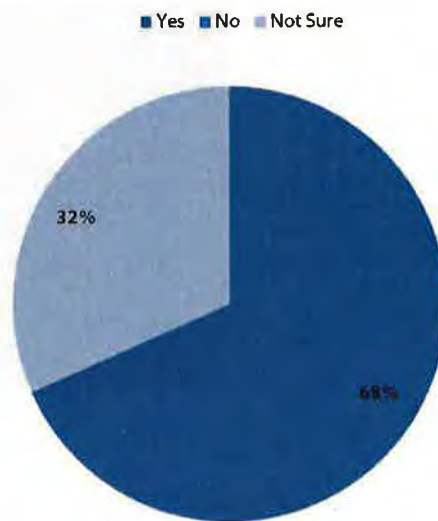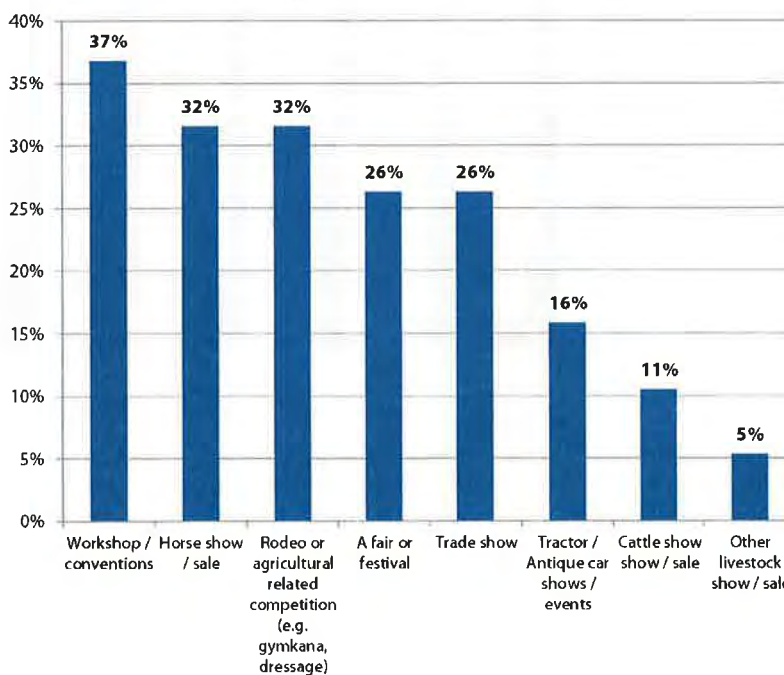
When asked how often their organization would use a new agricultural recreation facility if one were developed, the following was reported:

- 3 groups (19%) indicated that they would use it once per year.
- 4 groups (25%) indicated that they would use it 2-3 times per year.
- 9 groups (56%) indicated that they would use it 10+ times per year.

Note: No groups indicated usage levels of 4-6 times per year or 7 – 9 times per year.

■ Yes   ■ No   ■ Not Sure

32%

68%

What types of activities, events, and functions would your group use a new agricultural recreation facility for?

Group representatives were next provided with a list of various agri-recreation related activities, and asked to select those for which they would use a new agricultural recreation facility for if available. As illustrated in the accompanying graph, approximately one-third of respondents indicated that they would use the facility for workshops/conventions (37%), horse show/sales (32%) and rodeo or agricultural related competitions (32%).

Group questionnaire respondents were next provided with a list and asked to identify how important each would be when determining if their organization would use a new facility. The top three factors identified by the groups were sufficient parking (74% identified as very important), relationship with facility staff and volunteers (72% identified as very important) and the overall cost to use the facility (68% identified as very important). See the accompany graph for a complete overview of the findings.

How important are the following factors when determining how often your organization would use a new agricultural recreation facility?

	Sufficient parking spaces (RV and Trailer)	Relationship with facility staff and volunteers	Cost (rental rates)	Quality of the riding arena	Availability of on-site agricultural amenities (e.g. stabling	Sufficient spectator viewing areas	Quality of public address system for events	Adequate concessions	Availability of meeting room and banquet spaces	Ability to access on-site office and administrative space
Very Important	74%	72%	68%	59%	50%	50%	47%	42%	21%	11%
Somewhat Important	16%	28%	32%	12%	6%	39%	42%	32%	47%	28%
Neither Important nor Unimportant	5%	0%	0%	18%	28%	11%	11%	5%	11%	28%
Somewhat Unimportant	5%	0%	0%	0%	6%	0%	0%	11%	5%	11%
Very Unimportant	0%	0%	0%	12%	11%	0%	0%	11%	16%	22%

Group representatives were asked to select from a list the ways in which a new agricultural recreation facility could enhance the region. As illustrated in the following graph, the availability of new programs and events for residents (94%) and the ability to better retain and attract agricultural related businesses/spending (94%) were identified as the top reasons that group representatives thought a new facility could enhance the region.


In what ways would a new agricultural recreation facility enhance the region?
(18 Respondents)

- New programs and events for residents — 94%
- Retain and attract agricultural related businesses/spending — 94%
- Improve community pride — 72%
- Improve quality of life for residents — 72%
- Economic development — 67%
- Other, please specify... — 22%
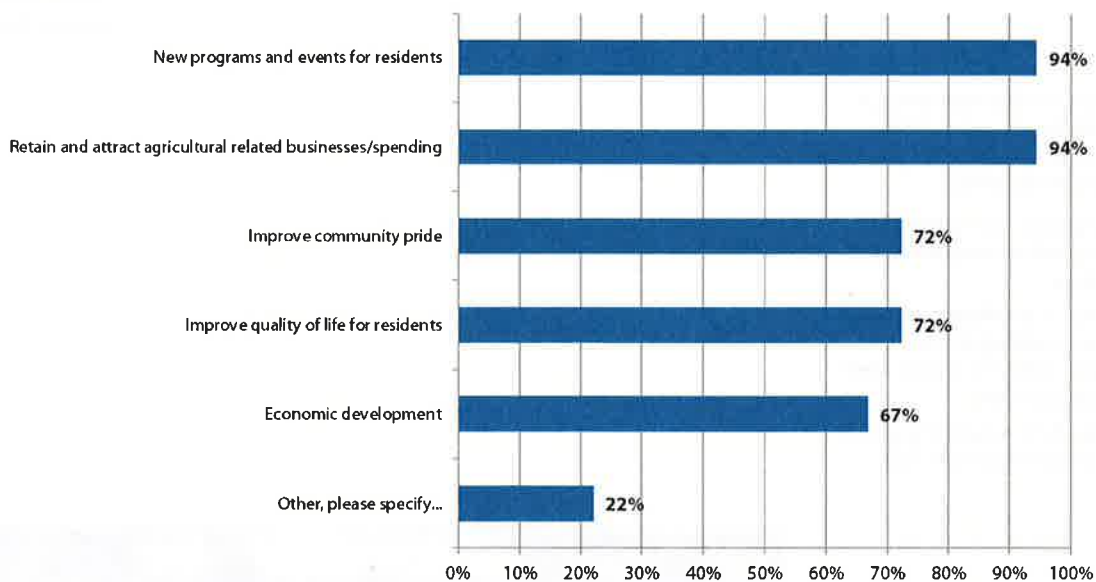
In what **ways would** your group be willing to partner
with the County and the Agricultural Society?
(16 Responses)

Respondents were next provided
asked about potential ways that their
organizations could partner with the County
and Agricultural Society in the development
of a new agricultural recreation facility in
the Rocky Mountain House area. As further
illustrated in the accompanying graph,
group representatives selected a number of
potential ways that they would be interested
in partnering. The top three selected
were providing input into facility design
(81%), helping with fundraising (69%) and
promotions and marketing (63%).
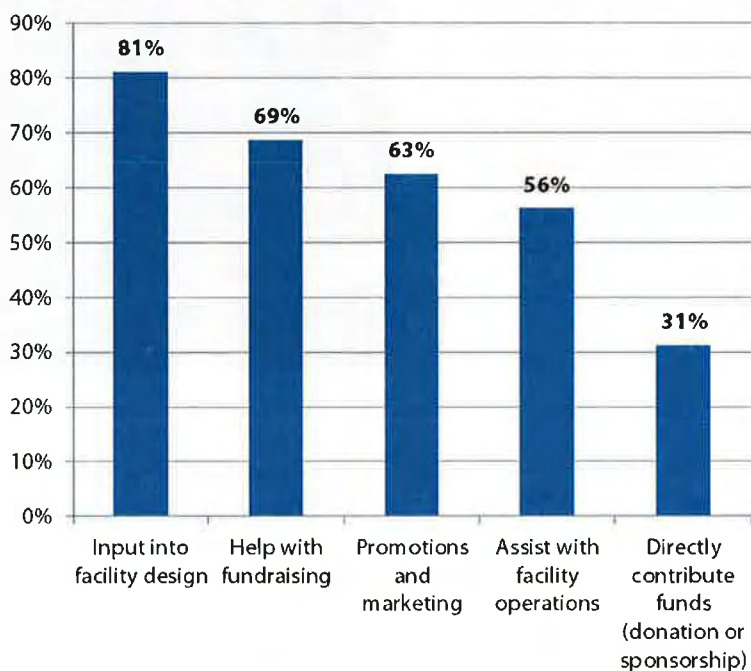
Groups were also provided with space in
the survey to indicate the approximate
hourly rates that their organization would be
willing to pay to use the facility.

- On an hourly basis, the majority of
  groups indicated amounts in the $15 -
  $20 hour range.
- For a half-day, 1/3 indicated amounts
  <$100, 1/3 were willing to pay
  approximately $100, 1/3 groups were
  willing to pay $300-400.
- For a full-day, 9/10 responding groups
  indicated amounts less than $650.

B. Interviews

Fourteen in-person group interviews were scheduled and conducted with individuals representing a variety of potential facility users, agricultural enthusiasts and community stakeholders. In total over 40 individuals participated in the interview sessions (in some cases individuals participated in two sessions). Interview groups were categorized and scheduled as follows. A listing of participating groups and organizations is provided in Appendix C.

- Horse 4-H Clubs
- Ranch Horse
- Town of Rocky Mountain House
- Beef 4-H Clubs
- Chamber of Commerce
- Purebreed Breeders
- Dog Groups
- Gymkhaha
- Stampede and Chuckwagon
- West Country Stakeholders
- Rodeo Groups
- ATV/RV
- Dirt Activities
- Other (non-affiliated)

A variety of perspectives were provided during the interview sessions. While the majority of participants were generally in favour of developing a new agricultural recreation facility, a number of important factors and considerations were shared with regards to operational models, facility components and amenities and the need for continued stakeholder engagement and involvement. Outlined as follows are key themes from the interview sessions.

SUPPORT FOR A FACILITY

- The majority of those interviewed were in favour of a new agricultural recreation facility being developed.
- Interviewees strongly indicated that current facilities / spaces do not meet the needs of many community groups.
- A number of those interviewed mentioned issues with dirt being put in the Town's arena (both from a user and Town perspective).
- The region has a strong agricultural background and lifestyle but no facility exists to support these activities.
- Many events cannot currently take place in RMH as a suitable facility does not exist.

IMPORTANT CONSIDERATIONS IF A NEW FACILITY IS DEVELOPED

- Needs to be multi-purpose and suitable for many different activities (even if not ideal for specific ones).
- Facility manager position is key- this person must be experienced and able to work with many different groups and organizations.
- A new facility needs to be accessible and affordable for community groups.
- A phased approach might be best to meet immediate needs and accommodate future growth and opportunities. facility does not exist.

AMENITIES & COMPONENTS THAT ARE NEEDED

- Indoor riding arena should be the 'core' component of any facility.
- Seating capacity of 300-600 was identified as the ideal number by most groups.
- Wash bays, box stalls, loading areas, sound system and parking were commonly identified as important amenities.
- A number of individuals indicated that there is a lack of large hall / exhibition spaces (>500) in the area, and wondered if this should be included in any new facility.

CONCERNS

- A number of past initiatives have failed and some groups / individuals are skeptical.
- Community users have limited ability to pay but facility can't be feasible unless they do.
- Horse and cow people don't get along- might have an impact on how a new facility is operated.
- A number of concerns were expressed over who might operate the facility.
  - » Issues might arise if only one not for profit group operates the facility.
  - » The County was commonly mentioned as needing to have a major role in the ownership and operations of a facility.
  - » Some interviewees expressed that a model similar to Ponoka might be best.

OWNERSHIP & OPERATIONS

- The majority of those interviewed expressed that a facility should be close to Rocky Mountain House.
  - » However a few individuals also suggested that if the County is owning and/or operating the facility it should be more centrally located.
  - » The majority of those interviewed expressed that the County should play a leading role in the project with support from community groups and businesses.
- Success of the facility will be dependent on strong management and cooperation between groups and stakeholders.

6

Facility Program & Site Selection Criteria

The following section outlines a facility program (components and amenities) along with a site selection criteria model that can be used in the future when evaluating potential sites for a potential facility

A. Facility Program

The facility program (components and amenities) was developed considering the research and consultation presented in earlier sections, feedback from the project steering committee and expertise of the consulting team. Architectural expertise was also engaged to identify the required spatial needs of each facility component.

The facility program reflects a phased approach to development and can be explained as follows:

PHASE 1

Development of new indoor agricultural recreation facility (riding arena) to meet basic community program and event needs.

PHASE 2

Addition of a banquet / exhibition facility in order to increase the event hosting capacity of the site and better meet community need. Existing indoor riding arena facility (Phase 1 development) is also enhanced with additional amenities (e.g. increased spectator seating, box stalls).

FACILITY PROGRAM: PHASE 1

FACILITY COMPONENT / AMENITY	DESCRIPTION	UNITS
INDOOR		
Indoor Riding Arena	Dirt floor, 150 x 250ft program area (including arena and warm-up area), 400 person seating capacity.	41,550 ft²
Press Box & Announcer's Booth	Production area for events.	750 ft²
Footing Storage	Covered area to store footing materials for arena.	5,000 ft²
Lobby Space	To meet expected usage and spectator capacity.	4,200 ft²
Multipurpose Program / Meeting Room	~50 person capacity.	1,200 ft²
Wash Racks	10 wash racks.	2,200 ft²
Temporary Indoor Stabling (Box Stalls)	For up to 100 animals, event use only, non-fixed structure.	22,400 ft²
Administration Areas / Office Space	4 offices and small common area for facility staff and user groups as required / permitted.	1,200 ft²
Storage	Storage areas for facility based equipment and supplies.	300 ft²
Concession	Basic concession space to meet expected usage and spectator capacity.	600 ft²
OUTDOOR		
Parking	To meet expected usage / capacity, to include adequate trailer parking.	Vehicle: 115 stalls Trailer: 60 stalls
Camping	Unserviced, up to 50 units.	65,250 ft²
Outdoor Show Ring / Practice Area	150 x 250ft, additional practice and program space, no seating.	37,500 ft²

FACILITY PROGRAM: PHASE 2

FACILITY COMPONENT / AMENITY	DESCRIPTION	UNITS
INDOOR		
Spectator seating	Addition of 400 seats to indoor riding arena (total capacity to 800 seats)	400 seats
Temporary stabling (box stalls)	Addition of non-fixed structure to accommodate another 100 animals (total capacity to 200 animals)	22,400 ft^2
Box office	Addition of box office to meet expanded event hosting needs	250 ft^2
Banquet / exhibition hall	1,000 person capacity, ~50 display booths	15,500 ft^2
Commercial kitchen	To service banquet / exhibition facility	3,000 ft^2
Multipurpose program / meeting rooms	2 rooms with a capacity of ~30 to service banquet / exhibition hall	1,200 ft^2
Storage	Storage to site meet expected usage / capacity of new exhibition facility.	2,000 ft^2
Administration areas / office space	4 offices to site meet expected usage and staffing needs	600 ft^2
OUTDOOR		
Parking	Additional parking to meet expanded usage / capacity of facility.	Vehicle: 430 stalls Trailer: 60 stalls
Camping	Addition of 25 unserviced stalls to accommodate expanded usage.	32,500 ft^2

B. Site Selection Criteria

While specific sites were not analyzed as part of the study, a site selection criteria model was developed to adjudicate the suitability of future sites should development of a facility proceed.

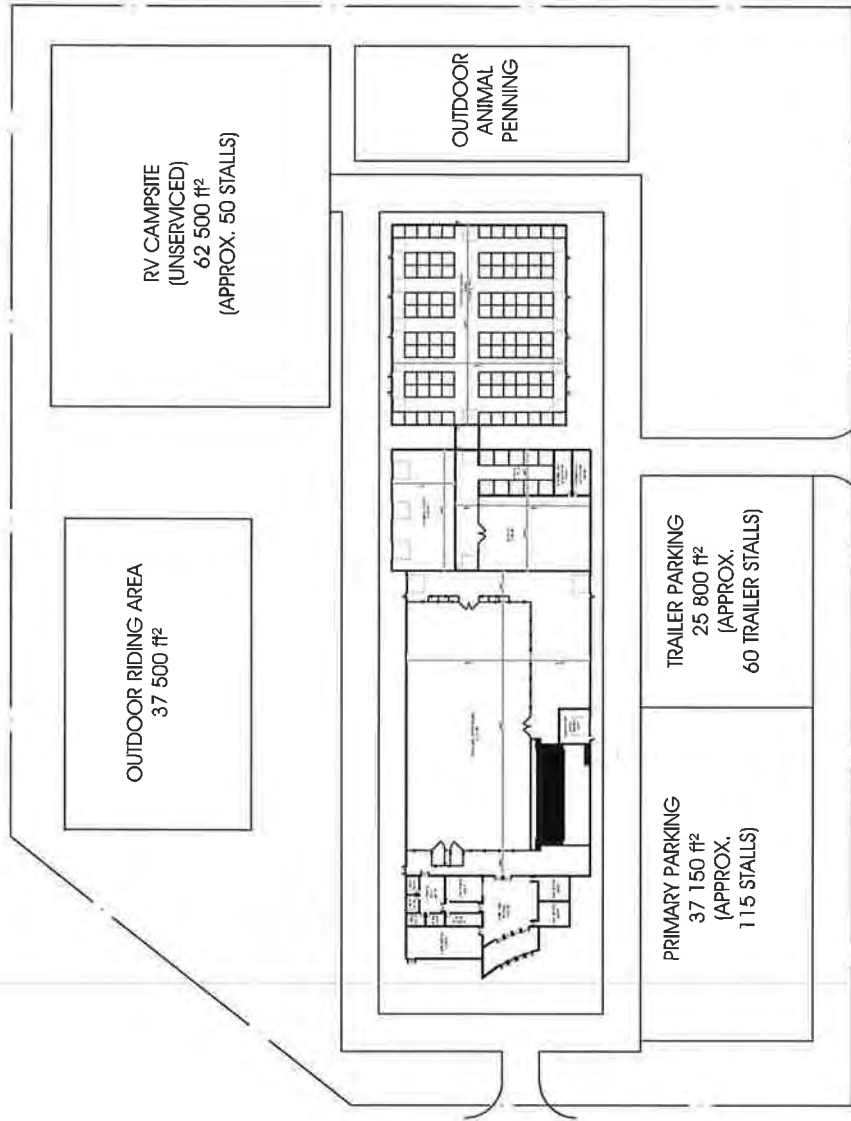| CRITERIA	SCORING	WEIGHTING
PROXIMITY TO POPULATION CENTRE	**1 point** = The site is conveniently and appropriately located in close proximity to Rocky Mountain House. **0 points** = The site is not conveniently and appropriately located in close proximity to Rocky Mountain House.	1
ABILITY TO ACCOMMODATE FUTURE EXPANSION	**1 point** = The site has the available land and service elements to accommodate future expansion. **0 points** = The site does not have the available land and service elements to accommodate future expansion.	1
PROXIMITY TO MAJOR ROADWAYS	**1 point** = The site is directly adjacent to major roadways (within 1.5 km or visible from major roadway). **0 points** = The site is not directly adjacent to major roadways (more than 1.5 km or not visible from major roadway).	1
PROXIMITY TO CONVENIENCE AMENITIES	**1 point** = The site is located in close proximity to accommodations and other retail services **0 points** = The site is not located in close proximity to accommodations and other retail services.	1
THAT THE SITE (LAND) IS PUBLICALLY OWNED	**1 point** = The site is owned (or available for purchase) by a public entity (e.g. government or not for profit) **0 points** = The site is to remain privately owned	1
AVAILABLE COST EFFICIENCIES	**1 point** = The site provides the potential for cost efficiencies during construction (e.g. existing site servicing, land suitability) **0 points** = The site is not currently serviced and/or will require other significant enhancements before facility construction can proceed.	1

7

Concept Plans

Presented as follows are concept and site plans for Phases 1 and 2.
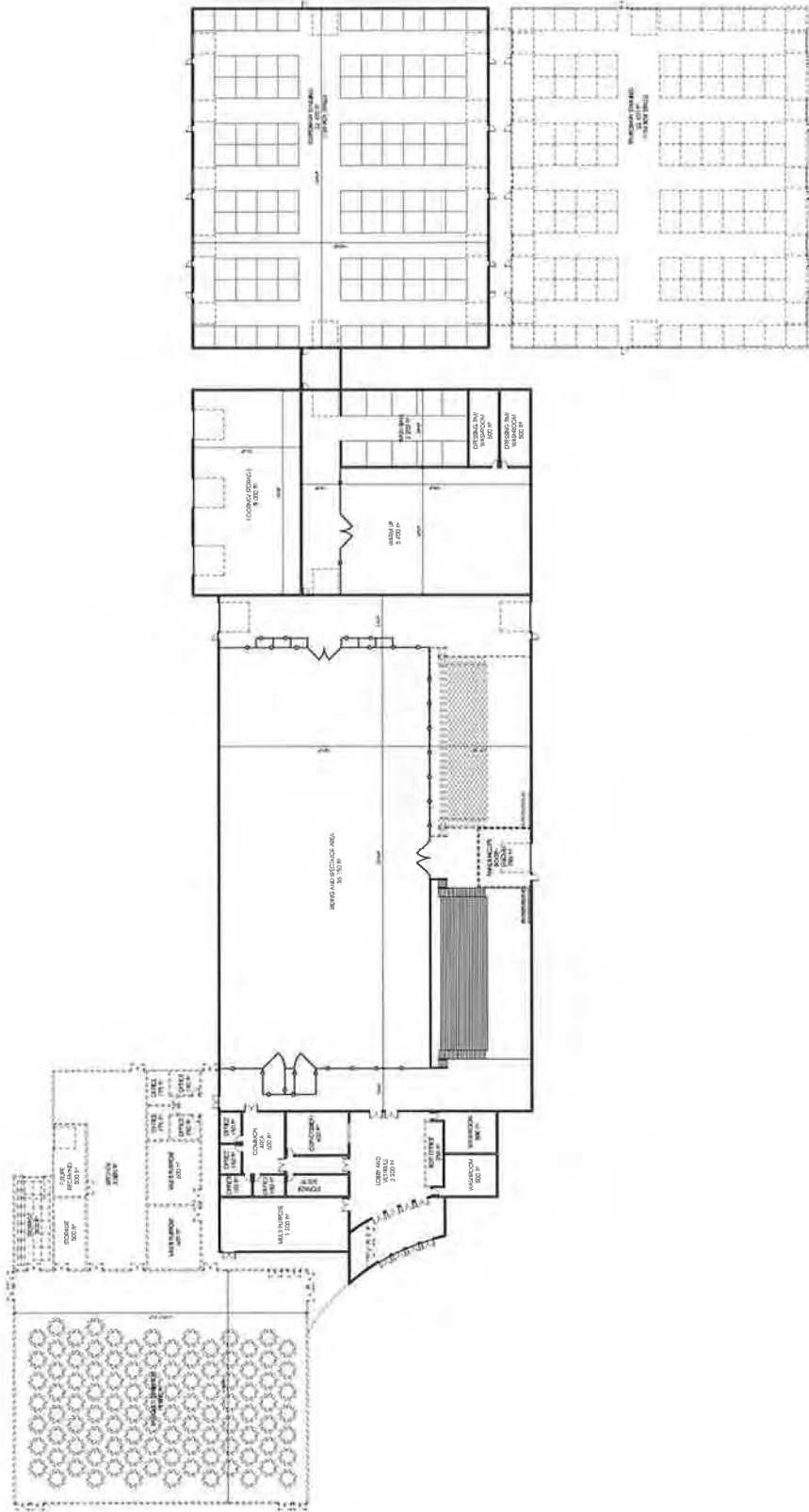
FLOOR PLAN: PHASE 1
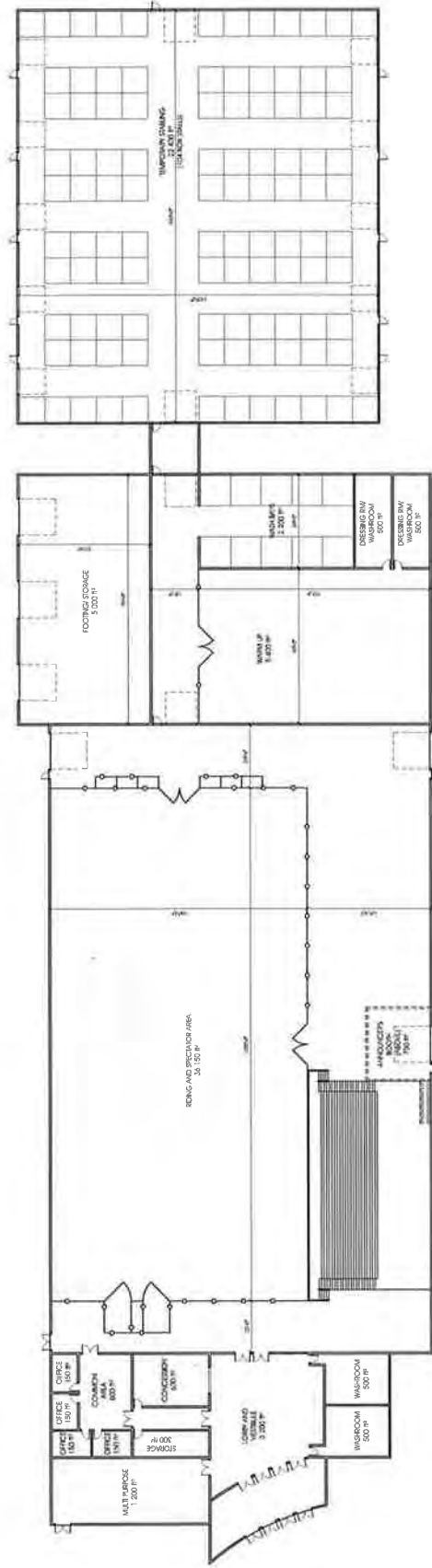
Note: The building reflected in the Phase 1 concept plan has been sized to accommodate expansion behind the Phase 2 additions.

SITE PLAN: PHASE 1

RV CAMPSITE
(UNSERVICED)
62 500 ft²
(APPROX. 50 STALLS)

OUTDOOR
ANIMAL
PENNING

OUTDOOR RIDING AREA
37 500 ft²

TRAILER PARKING
25 800 ft²
(APPROX.
60 TRAILER STALLS)

PRIMARY PARKING
37 150 ft²
(APPROX.
115 STALLS)

	m²	ft²	acres	Ha
TOTAL SITE AREA	51,856	538,171	12.81	5.19

FLOOR PLAN: PHASE 2

SITE PLAN: PHASE 2

RV CAMPSITE
(UNSERVICED)
62 500 ft²
(APPROX. 50 STALLS)

OUTDOOR
ANIMAL
PENNING

RV CAMPSITE
(UNSERVICED)
32 500 ft²
(APPROX. 25 STALLS)

OUTDOOR RIDING AREA
37 500 ft²

PRIMARY TRAILER
PARKING
25 800 ft²
(APPROX.
60 TRAILER STALLS)

SECONDARY TRAILER
PARKING
25 800 ft²
(APPROX.
60 TRAILER STALLS)

PRIMARY PARKING
37 150 ft²
(APPROX.
115 STALLS)

SECONDARY PARKING
40 500 ft²
(APPROX.
125 STALLS)

SECONDARY PARKING
98 000 ft²
(APPROX.
305 STALLS)

	m²	ft²	acres	Ha
TOTAL SITE AREA	92,317	993,689	22.81	9.23

8
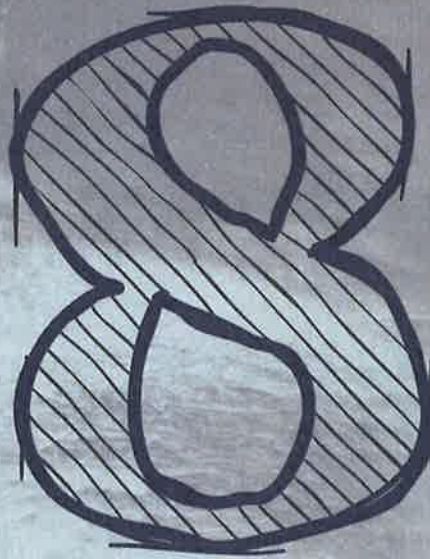
Financial Implications

The following section outlines the projected financial implications associated with developing the multi-purpose agricultural recreation facility as outlined in Section 6. Presented is a capital cost estimate (construction costs), operating cost estimate, potential funding framework and a risk analysis.

A capital cost estimate has been developed based on the facility program elements outlined in Section 6. All indoor spaces are reflected on a per unit basis for each potential space in the facility and do not include the cost of acquiring land. The numbers reflected are accurate +/- 20% and are based on current construction costs.

A. Capital Cost Estimates

The following chart summarizes the estimated capital costs for the three phases of the project. A detailed breakdown of the capital costs for each potential phase is outlined on the following pages. As the opportunity may exist to share outdoor components and amenities (e.g. parking, camping) with other future developments or facilities that are included on, or adjacent to, a potential site; the capital costs for the project have been broken down by indoor and outdoor spaces.

Note: The sub total cost reflected for each phase excludes potential fees, contingency and FFE allocations. The total cost for each phase has been calculated to include all potential fees, contingency and FFE allocations. See the following pages for additional detail on how each figure has been calculated.

PHASE	INDOOR ($)	OUTDOOR ($)	TOTAL
PHASE 1 (SUB TOTAL)	$9,283,750	$742,500	$10,026,250
PHASE 1 (TOTAL)	$11,140,500	$891,000	$12,031,500
PHASE 2 (SUB TOTAL)	$7,527,500	$865,000	$8,392,500
PHASE 2 (TOTAL)	$9,033,000	$1,038,000	$10,071,000

PHASE 1

FACILITY COMPONENT / AMENITY	UNITS	COST	OVERALL COST
INDOOR			
Indoor riding arena (400 seat capacity)	41,550 ft^2	$125	$5,193,750
Press box and announces booth	750 ft^2	$300	$225,000
Footing storage	5,000 ft^2	$75	$375,000
Lobby space	4,200 ft^2	$250	$1,050,000
Multipurpose program / meeting room	1,200 ft^2	$250	$300,000
Wash racks	2,200 ft^2	$225	$495,000
Temporary indoor stabling (box stalls)	22,400 ft^2	$50	$1,120,000
Administration areas / office space	1200 ft^2	$250	$300,000
Storage	300 ft^2	$250	$75,000
Concession	600 ft^2	$250	$150,000
Sub Total INDOOR SPACES	**79,400 ft^2**		**$9,283,750**
OUTDOOR			
Parking: Vehicles	115 stalls	$1,500	$172,500
Parking: Trailers	60 stalls	$2,000	$120,000
Camping / RV Parking	50 spots	$4,000	$200,000
Outdoor ring		$250,000	$250,000
Sub Total OUTDOOR SPACES			**$742,500**
Sub Total PHASE 1			**$10,026,250**
Fees (10%)			**$1,002,625**
Contingency (5%)			**$501,313**
Furniture, Fixtures and Equipment (5%)			**$501,353**
Total Phase 1			**$12,031,500**

PHASE 2

FACILITY COMPONENT / AMENITY	UNITS	COST	OVERALL COST
INDOOR			
Spectator seating—Addition to existing facility.	400 seats	$5 0	$20,000
Temporary stabling (box stalls)—Addition to existing facility.	22,400 ft²	$50	$1,120,000
Box office—Addition to existing facility.	250 ft²	$250	$62,500
Banquet / exhibition hall	15,500 ft²	$250	$3,875,000
Commercial kitchen	3,000 ft²	$500	$1,500,000
Multipurpose program / meeting rooms	1,200 ft²	$250	$300,000
Storage	2,000 ft²	$250	$500,000
Administration areas / office space	600 ft²	$250	$150,000
Sub Total INDOOR SPACES			**$7,527,500**
OUTDOOR			
Parking: Vehicles	430 stalls	$1,500	$645,000
Parking: Trailers	60 stalls	$2,000	$120,000
Camping	32,500 ft²	$4,000	$100,000
Sub Total OUTDOOR SPACES			**$865,000**
Sub Total PHASE 2			**$8,392,500**
Fees (10%)			**$839,250**
Contingency (5%)			**$419,625**
Furniture, Fixtures and Equipment (5%)			**$419,625**
Total Phase 2			**$10,071,000**

B. Operating Cost Estimates

Operating cost estimates have been developed for Phases 1 and 2 of the potential project. As potential capital and operating partnerships have not yet been determined, the budgets presented are estimates based primarily on expected se and do not include potential debt servicing or revenues that may result from partnerships of public sector support.

PHASE 1

FACILITY COMPONENT / AMENITY	COST	ASSUMPTION
REVENUE		
Main Event		
Riding Arena Bookings	$40,000	40 events days / year (20 weekends), $1000 / day.
Box Stall Rentals	$60,000	10 events requiring stabling, 2 nights / events, average 75 animals / event, $40 / day.
Community Use		
Riding Arena Weekend (Community Event) Bookings	$20,000	40 event days / year (20 weekends), $500 / day.
Riding Arena Hourly (Community Program) Bookings	$31,200	20 hours / week (1040 / year), $30 / hour.
Open Riding Annual Memberships	$15,000	100 members, $150 annual membership.
Open Riding Drop-In Passes	$20,800	20 drop-in riders / week (1040 visits / year), $20 / ride.
Multipurpose Program / Meeting Room		
Room Rentals (~50 Capacity)	$15,600	10 hours / week (520 / year), $30 / hour.
Leases		
Concession / Food Service	$0	Assumed net zero.
Office Space	$0	Internal use and assumed to be provided to community as required at no cost.
Outdoor Spaces		
Outdoor Ring	$0	Assumed to be complimentary to building events / programs.
Camping	$10,000	10 events with camping requirements, 50 unserviced stalls, $20 / night.
Other		
Facility Naming	$0	Assumed to capital costs.
Facility Signage	$10,000	20 spots, $500 / spot (average).
Operating Grants	$0	Operating structure not currently defined.
Total REVENUES	**$222,600**	

FACILITY COMPONENT / AMENITY	COST	ASSUMPTION
EXPENSES		
Salaries and wages		
Manager	$75,000	1.0 FTE @ $75,000 / year.
Scheduling & Administration	$0	Assumed responsibility of Manager.
Janitorial	$45,000	1.5 FTE @ $30,000 / year.
Maintenance & Operations	$45,000	1.5 FTE @ $30,000 / year.
Benefits	$16,500	10% of staffing costs.
Training	$1,000	Estimated.
Event Staffing / Security	$20,000	Estimated.
Operations		
Utilities: Arena	$39,400	39,400 ft^2 @ $1.00 ft^2.
Utilities: Other Indoor Spaces	$18,000	7,200 ft^2 @ $2.50 ft^2.
Camping	$10,000	Estimated based on 50 unserviced stalls.
Waste Removal	$10,000	Estimated.
Janitorial Supplies	$10,000	Estimated.
Site Maintenance	$7,500	Estimated.
Fuel	$5,000	Estimated.
Insurance	$10,000	Estimated.
Equipment (Lease, Repair, Maintenance)	$20,000	Estimated.
Office Supplies, Internet, Phone	$7,500	Estimated.
Marketing & Advertising	$10,000	Estimated.
Other / Miscellaneous	$2,500	Estimated.
Total EXPENSES	**$352,400**	

Net Operations **(Amount of Additional Funding Required)**	**-$129,800**	

PHASE 2

FACILITY COMPONENT / AMENITY	COST	ASSUMPTION
REVENUE		
Major Event		
Riding Arena Bookings	$40,000	40 event days / year (20 weekend), $1000 / day.
Exhibition / Banquet Facility Bookings	$75,000	50 event days / year, $1,500 / day including kitchen.
Box Stall Rentals	$120,000	15 events requiring stabling, 2 nights / events, average 100 animals / event, $40 / day.
Community Use		
Riding Arena Weekend (Community Event) Bookings	$20,000	40 event days / year (20 weekend), $500 / day.
Riding Arena Hourly (Community Program) Bookings	$31,200	20 hours / week (1040 hours per year), $30 / hour.
Open Riding Annual Memberships	$15,000	100 members, $150 annual membership
Open Riding Drop-In Passes	$20,800	20 drop-in riders / week (1040 visits / year), $20 / ride.
Exhibition / Banquet Facility Bookings	$37,500	50 event days / year, $750 / day including kitchen.
Multipurpose Program / Meeting Room		
Phase 1 Room Rentals (~50 capacity)	$15,600	10 hours / week (520 / year), $30 / hour.
Phase 2 Room Rentals (~30 capacity x 2 rooms)	$10,400	5 hours / week per room (520), $20 / hour.
Leases		
Concession / Food Service	$20,000	Estimated based on expected usage.
Office Space	$0	Internal use and assumed to be provided to community as required at no cost.
Outdoor Spaces		
Outdoor Ring	$0	Assumed to be complimentary to building events / programs.
Camping	$22,500	15 events with camping requirements, 75 unserviced stalls, $15 / night.
Other		
Facility Naming	$0	Assumed to capital costs.
Facility Signage	$15,000	30 spots, $500 / spot (average)
Operating Grants	$0	Operating structure not currently defined.
Total REVENUES	**$443,000**	

FACILITY COMPONENT / AMENITY	COST	ASSUMPTION
EXPENSES		
Salaries and wages		
Manager	$75,000	1.0 FTE @ $75,000 / year.
Scheduling & Administration	$20,000	0.5 FTE @ 40,000 / year.
Janitorial	$60,000	2.0 FTE @ $30,000 / year.
Maintenance & Operations	$60,000	2.0 FTE @ $30,000 / year.
Benefits	$21,500	10% of staffing costs.
Training	$1,500	Estimated.
Event Staffing / Security	$20,000	Estimated.
Operations		
Utilities: Arena	$39,400	39,400 ft^2 @ $1.00 ft^2.
Utilities: Exhibition / Banquet Facilities	$38,750	15,500 ft^2 @ $2.50 ft^2.
Utilities: Other Indoor Spaces	$30,000	12,000 ft^2 @ 2.50 ft^2.
Camping	$15,000	Estimated based on 75 unserviced stalls.
Waste Removal	$10,000	Estimated based on expected usage.
Janitorial Supplies	$20,000	Estimated based on expected usage.
Site Maintenance	$10,000	Estimated based on expected usage.
Fuel	$7,500	Estimated based on expected usage.
Insurance	$20,000	Estimated.
Equipment (Lease, Repair, Maintenance)	$30,000	Estimated based on expected usage.
Office Supplies, Internet, Phone	$10,000	Estimated.
Marketing & Advertising	$15,000	Estimated.
Other / Miscellaneous	$2,500	Estimated.
Total EXPENSES	$506,150	

Net Operations (Amount of Additional Funding Required)	**-$63,150**	

C. Potential Funding Model

To cover the capital costs associated with the project it is likely that funding will need to be procured from a variety of sources which may include local and provincial levels of government, community fundraising and the private sectors. In order for fundraising to proceed the project partners will first need to determine responsibilities as they pertain to facility operations and ownership.

Outlined below is a potential funding model for the capital cost of the project based on similar projects across the province. The contributions reflected are a preliminary model only, and are likely to evolve should the project come to fruition.

FUNDING SOURCE	CONTRIBUTION (%)
LOCAL GOVERNMENT SOURCES	50%
OTHER GOVERNMENT OR PUBLIC SOURCES	25%
FUNDRAISING (DONATION AND SPONSORSHIPS)	25%

D. Risk Analysis

The majority of large facility development projects come with inherent risks to stakeholders. The identification of these risks and development of mitigation strategies can help ensure these factors are properly managed or avoided. Identified in the chart below are potential risks associated with the project along with mitigation strategies that should be implemented if development of the proposed facility proceeds.

RISK	PROBABILITY	PROJECT IMPACT	MITIGATION STRATEGIES
INABILITY TO RAISE THE CAPITAL FUNDS REQUIRED.	Unknown	High	• Ongoing and productive discussions between all internal project stakeholders. • Development of a comprehensive fundraising strategy.
LACK OF PUBLIC AND "BUY-IN"	Medium	High	• Ongoing consultation and communication with public. • Involvement in facility planning and fundraising (directly or via committee).
INABILITY TO COVER OPERATING COSTS ASSOCIATED WITH THE FACILITY.	Unknown	High	• Ongoing and productive discussions between all internal project stakeholders. • Further identification of revenues and expenses as project evolves. • Detailed business planning if facility is developed.
INCREASING COMPETITION IN THE "AGRI-RECREATION" MARKET.	Medium	Medium	• Continued analysis of fees being charged by market are facilities. • Recruitment of a Facility Manager with strong understanding of the regional marketplace.
POTENTIAL STAKEHOLDER AND USER GROUP CONFLICTS .	Low	Medium	• Ensure that all aspects of the facility project are well communicated. • Equitable treatment of potential user groups.
COMPETING PROJECTS (PUBLIC OR PRIVATE SECTOR)	Unknown	Medium	• Continued analysis of regional landscape. • Communication between municipalities and private sector.

9

Conclusions

Outlined as follows is a summary of the Agricultural Recreation Facility Feasibility Study.

This study has been compiled to help decision makers better understand market needs for, and the financial consequences associated with, the development of an agricultural recreation facility in Clearwater County. The study has been based on research and consultation with a wide range of stakeholder groups and individuals.

The facility program (components and amenities) and capital cost estimates have been developed using a phased approach which can be explained as follows:

PHASE 1

Development of new indoor agricultural recreation facility (riding arena) to meet basic community program and event needs.

PHASE 2

Addition of a banquet / exhibition facility in order to increase the event hosting capacity of the site and better meet community need. Existing indoor riding arena facility (Phase 1 development) is also enhanced with additional amenities (e.g. increased spectator seating, box stalls).
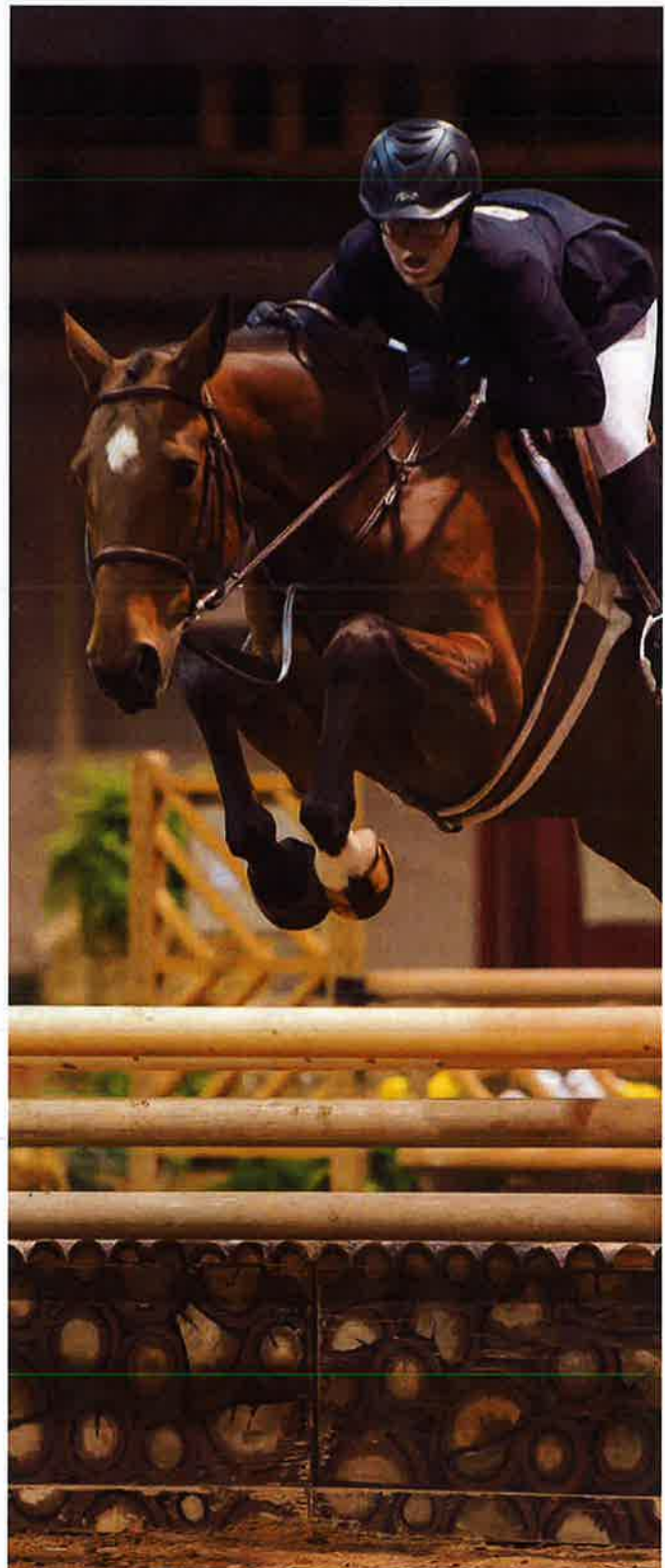
The expected capital cost impacts of facility development are expected to be in the order of $12.031 million for Phase 1 and $10.071 million for Phase 2. These estimates reflect 2014 dollars.

Operating cost projections developed and outlined in the study indicate that some level of additional funding or subsidy will be required.

It is important to note that although the capital and operating costs estimates contained herein could be reduced via different approaches to constriction (design-build, etc.) or through operating partnerships between local municipalities and not for profit organizations.

Based on the information contained in the study, decision makers now have sufficient information to decide whether or not it is viable to move forward with the project. Should the development of a new indoor agricultural recreation facility proceed, the following sequence of next steps are suggested.

1. Further clarify / finalize the capital and operating model.
2. Acquire a site.
3. Determine the construction method.
4. Develop a detailed business plan.
5. Construct the facility.
6. Operate the facility.

A

Stakeholder Group Questionnaire

RMH Agricultural Society

AGRICULTURAL RECREATION FACILITY FEASIBILITY STUDY
Stakeholder Group Questionnaire

The Rocky Mountain House Agricultural Society, with support from Clearwater County, is developing a feasibility study to explore the potential development of an agricultural recreation facility. RC Strategies, an Alberta based recreation and community infrastructure planning company, has been retained by the Society and County to develop the Study.

Conceptually, a multi-purpose agricultural recreation facility could be used for a variety of events and programs such as equine and rodeo competitions, livestock shows, trade shows, youth agricultural and educational programs and social gatherings. The Feasibility Study will determine the need, viability and costs of developing the facility and help identify the types of components and amenities that are required.

Your organization is invited to provide feedback which will be used to help determine the current and future needs for such as facility in the Rocky Mountain House area. **Please complete the questionnaire on behalf of your organization by April 18, 2014 (only one questionnaire per group please).** The questionnaire can be returned by fax to 780.426.2734, emailed to **slawuta@rcstrategies.ca** or mailed to the address below:

RC Strategies
10315 109 Street NW
Edmonton, Alberta
Canada T5J 1N3

If your organization has any additional comments or questions regarding this questionnaire or the Study, please contact **Stephen Slawuta** (RC Strategies) at **780.441.4267.**

SECTION I: ORGANIZATION PROFILE

1. Please fill out the information below.

Organization Name: _____

Contact Name & Position with Organization: _____

Contact Phone Number & Email Address: _____

2. Briefly explain the purpose of your organization and its major activities.

_____
_____
_____

3. What age group(s) best describe(s) your organization's members / participants or clients? Please check (✔) all that apply.

☐ Preschool (age 0 – 5)   ☐ Youth (6 – 12)   ☐ Teens (13 – 17)

☐ Adult (18 – 59)   ☐ Senior (65+)

1

4. How many participants / members or clients belong to your organization? If available, please provide historical data.

	2012	2013	2014
Participants / members / clients:			

5. Over the next couple of years, what are your expectations for participant / membership or client numbers?

☐ Grow

☐ Remain Stable

☐ Decline

6. Please provide an estimate of the residency for your organization's members / participants or clients. (Note—numbers should add up to 100%)

_____ % Clearwater County

_____ % Town of Rocky Mountain House

_____ % **Other**

_____100%_____

SECTION II: CURRENT FACILITY USAGE

7. Please list below up to five facilities in the region that your group uses most frequently. For each facility please check (✔) how many times in the previous 12 months your organization used it.

FACILITY	1 – 9 USES	10 – 20 USES	21 OR MORE USES
1.	☐	☐	☐
2.	☐	☐	☐
3.	☐	☐	☐
4.	☐	☐	☐
5.	☐	☐	☐

8. Are the current facilities in the region adequate to meet your organization's needs?

☐ Yes

☐ No

☐ Not Sure

8a. Please explain your answer.

_____

_____

_____

2

SECTION III: NEW FACILITY NEEDS & USAGE

9. Answering on behalf of your organization, do you think that there is a need for a new agricultural recreation facility to be developed in the Rocky Mountain House area?

    ☐   Yes

    ☐   **No** (If "No", please go to Question 11.)

    ☐   Not Sure

10. Answering on behalf of your organization, **please check (✓) up to five** components / amenities that should be included in a new agricultural recreation facility.

☐	Full sized indoor riding arena	☐	Permanent grandstand seating
☐	Outdoor riding ring	☐	Equine trails / cross country course
☐	Warm-up arena	☐	Stabling
☐	Enclosed viewing area	☐	Unheated storage space
☐	Indoor balcony	☐	Heated storage space
☐	Outdoor balcony	☐	Meeting rooms
☐	Outdoor RV parking areas	☐	Office space for community groups
☐	Banquet / Lounge area for social events	☐	Box office
☐	Museum and interpretive spaces	☐	Cached indoor livestock storage
☐	Integrated indoor / outdoor announcers area	☐	Concession areas
☐	Other (please specify): _____		

11. Would your organization use a new agricultural recreation facility should one be built in the Rocky Mountain House area?

    ☐   Yes

    ☐   No

    ☐   Not Sure

12. If a new agricultural recreation facility was developed in the Rocky Mountain House area, how often would your organization use the facility each year?

    ☐   Not at all

    ☐   Once per year

    ☐   2 – 3 uses per year

    ☐   4 – 6 uses per year

    ☐   7 – 9 uses per year

    ☐   10+ uses per year

3

13. Please indicate below the types of activities, events, and functions for which your group would use a new agricultural recreation facility in the Rocky Mountain House area. You may check (✔) multiple items.

☐	Horse show / sale	☐	Cattle show / sale
☐	Other livestock show / sale	☐	Tractor / Antique car shows / events
☐	A fair or festival	☐	A farmers' market
☐	Trade show	☐	Workshops / conventions
☐	Rodeo or agricultural related competition (e.g. gymkana, dressage)	☐	Other (please specify): _____

14. Answering on behalf of your organization, please indicate how important each of the following factors would be when determining how often your organization would use a new agricultural recreation facility in the Rocky Mountain House area. Please check (✔) one rating per row.

	VERY IMPORTANT	SOMEWHAT IMPORTANT	NEITHER IMPORTANT NOR UNIMPORTANT	VERY UNIMPORTANT	SOMEWHAT UNIMPORTANT
Quality of the riding arena	☐	☐	☐	☐	☐
Availability of on-site agricultural amenities (e.g. stabling areas, livestock storage, wash bays)	☐	☐	☐	☐	☐
Cost (rental rates)	☐	☐	☐	☐	☐
Availability of meeting room and banquet spaces	☐	☐	☐	☐	☐
Ability to access on-site office and administrative space	☐	☐	☐	☐	☐
Adequate concessions	☐	☐	☐	☐	☐
Sufficient parking space (RV and Trailer)	☐	☐	☐	☐	☐
Sufficient spectator viewing areas	☐	☐	☐	☐	☐
Quality of public address system for events	☐	☐	☐	☐	☐
Relationship with facility staff and volunteers	☐	☐	☐	☐	☐
Other (please specify): _____	☐	☐	☐	☐	☐

15. In what ways do you think a new agricultural recreation facility could enhance the region? Please select all the apply.

☐	Improved quality of life	☐	New programs and events for residents
☐	Economic development	☐	Improved community pride
☐	Retain agricultural related business / spending	☐	Other (please specify): _____

4

SECTION IV: PARTNERSHIPS & CONTRIBUTIONS

16. From the list below, please check (✔) any ways that your organization might be able to partner with or assist the Agricultural Society and County in developing a new agricultural recreation facility in the Rocky Mountain House area.

    ☐ Help with fundraising

    ☐ Directly contribute funds (donation or sponsorship)

    ☐ Input into facility design

    ☐ Promotions and marketing

    ☐ Assist with facility operations

    ☐ Other (please specify): _____

17. If a new agricultural recreation facility were developed in the Rocky Mountain House area, what is the approximate hourly rental rate that your group would be willing to pay for use of the facility?

    $ _____ / hour

    $ _____ / half-day

    $ _____ / per full-day

SECTION V: GENERAL COMMENTS

Do you have any additional comments to make concerning a potential new agricultural recreation facility in the Rocky Mountain House area?

_____

_____

_____

_____

_____

Thank you for your input!

5

B
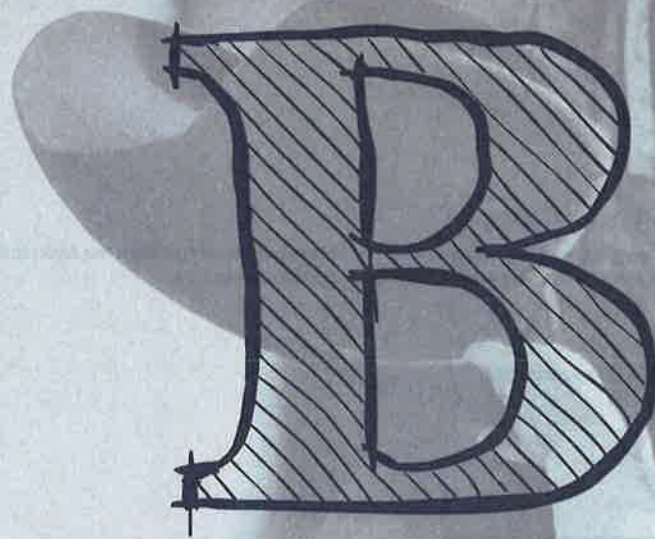
Stakeholder Group Questionnaire Respondents

1	Leslieville Antique and Model Club
2	Pentagon Farm Centre
3	Pentagon Farm Centre
4	Willow Mist Farm
5	Gilby 4H Beef Club
6	Miniatures In Motion Horse club
7	Rocky logger sports
8	Rocky Wag N Train
9	Cromdale Farm
10	Rocky Youth Rodeo
11	Bits 'n spurs 4-H Club
12	West Country Harness Club
13	Black Orchid Gypsy Cobs & Drum Horses
14	Caroline School
15	Rocky Mountain House & District Chamber of Commerce
16	Rocky North 4-H Multi club
17	Condor School
18	Quarter Horse Association of Alberta
19	Rocky Mountain Gymkhana Club
20	Rocky Mountain House Agricultural Society
21	Clearwater Farmers Market
22	Leslieville Trail Trotters 4-H Club
23	Rocky Mountain Chuckwagon Association (RMCA)

C

Interview Sessions
Participating Groups
& Organizations

Horse 4-H

- Bits & Spurs Equine Youth 4-H
- Leslieville Trail Trotters

Ranch Horse

- Cutting / Team Penning
- Team Ropers
- Ranch Horse Versatility
- Sorting

Town of Rocky Mountain House

- Recreation Department Staff
- Elected Officials
- Economic Development
- Planning

Beef 4-H Clubs

- Gilby 4-H Beef
- Rocky North 4-H Beef
- Rocky South 4-H Beef
- Hazeldell 4-H Beef
- Show & Sale Committee

Rocky Mountain House Chamber of Commerce

Purebred Breeders

- Lucky Springs Farms
- Crooked Post Shorthorns
- Coles Auction Mart

Dog and Canine Programs

- Agility
- Obedience
- Alberta Stock Dog Association

Gymkhana Representatives

Stampede Groups

- Rocky Wranglers
- Rocky Stampede Association
- Pony Chucks

West Central Stakeholders Group

Rodeo Groups

- Barrel Racing
- High School Rodeo
- Bullarama

ATV / RV

- Local retailers and exhibitors

Other Dirt Users

- Rocky Lumberjack Association

Image Attributions

RMH Agricultural Society

AGENDA ITEM

PROJECT: Delegation – Plains Bison Reintroduction – David Gummer, Wildlife Ecologist, Banff National Park		
PRESENTATION DATE: November 22, 2016		
DEPARTMENT: **Ag. Services and Landcare**	**WRITTEN BY:** **Matt Martinson**	**REVIEWED BY:** **Ron Leaf**
BUDGET IMPLICATION: ☒ N/A ☐ Funded by Dept. ☐ Reallocation		
LEGISLATIVE DIRECTION: ☒None ☐ Provincial Legislation (cite) ☐ County Bylaw or Policy (cite)		
STRATEGIC PLAN THEME: **2 Well governed organization**	**PRIORITY AREA:** **2.5 Advocate in the best interests of our community**	**STRATEGIES:** **2.5.2 Foster partnerships and discuss issues of mutual concern.**
ATTACHMENT(S): **1) Bison DEIA Exec. Summary.** **2) Backgrounder – Bison Reintroduction.** **3) FAQ's Bison** **4) Kay and White archeological evidence.**		
RECOMMENDATION: That Council accepts the presentation from Parks Canada as information.		

BACKGROUND:

Parks Canada is developing a 5 year pilot project around the reintroduction of Plains Bison into the Banff National Park. Parks Canada has committed to providing information and allowing opportunity for feedback from adjacent municipalities including Clearwater County. Parks Canada representatives are here today to provide information and answer questions regarding the reintroduction.

Banff
National Park

H2

Detailed Environmental Impact Analysis

Plains Bison Reintroduction in Banff National Park
Pilot Project 2017-2022

Executive Summary

Parks Canada Parcs Canada

Canadä

Introduction

Parks Canada is proposing to reintroduce a small herd of plains bison to Banff National Park (BNP) in 2017. The intent of this pilot project is to assess the feasibility of longer-term bison restoration in the area. Reversible and adaptive, this project provides a focal point for Parks Canada to work collaboratively with Canadians and Indigenous People, while beginning to restore the roles of bison in the ecosystem.

Background

According to early explorer accounts and archaeological evidence, bison were abundant in the Banff area prior to being extirpated by overhunting in the 1850s. Currently, plains bison occur in only five isolated wild subpopulations and occupy less than 0.5% of their original range in Canada. As a world leader in conservation, Parks Canada is committed to restoring native ecosystems and to the conservation of threatened species like the plains bison.

Reintroducing plains bison also contributes to Parks Canada's mandate to "protect and present nationally significant examples of Canada's natural and cultural heritage."

Purpose of the Detailed Environmental Impact Analysis

Given the complexity of reintroducing a keystone species that has been absent from this area for over 140 years, Parks Canada has determined that a detailed environmental impact analysis (DEIA) is required to evaluate the project. The DEIA process ensures that Parks Canada has a clear understanding of the potential project impacts; positive, neutral and negative, and is prepared to address any risks or adverse impacts. A final Determination of Impacts will be made after reviewing and considering feedback from the public review of this analysis. This Determination of Impacts, along with public comments received throughout the project, and any other relevant information, will be considered by the Superintendent in making a final decision about whether and how the project may proceed.

Scope of the Detailed Environmental Impact Analysis

Parks Canada evaluated the following valued components as part of the DEIA: soil, vegetation and fire; wildlife resources; aquatic resources; cultural resources; species at risk; visitor experience; and the socio-economic dynamics of surrounding human communities. No impacts on air quality or climate are expected.

The timeframe of the analysis was the 5-year-pilot project, beginning in January 2017. This period was expanded for the cumulative effects assessment to consider future projects. The geographic scope varied with the valued component. For soil, vegetation, wildlife, aquatic, visitor experience and cultural components, the analysis was conducted at the scale of the reintroduction zone. The socioeconomic component was evaluated at a regional scale to capture potential impacts to the agriculture industry.

Overview of Pilot Project to Reintroduce Bison

For the proposed pilot project, a small herd of bison would roam a reintroduction zone spanning 1,189 km² of the eastern slopes of Banff National Park. Like many reintroduction projects, the success of the Banff reintroduction would require a phased and hands-on approach. In early 2017, a small herd of healthy bison from Elk Island National Park would be transferred to an enclosed pasture system within the heart of the reintroduction zone where they would remain for approx. 16 months. Called a "soft-release", this approach is a common practice for reintroduction programs to help the animals bond to their new home. After 16 months, the new herd will be free to explore the full reintroduction zone. Fifteen short sections of wildlife-friendly fencing will complement the natural containment provided by rock ridges and cliffs to encourage the bison to remain within the reintroduction zone. After five years, Parks Canada would conduct a detailed evaluation to assess the feasibility of maintaining the project, expanding the vision, or withdrawing from the initiative.

The project would be implemented in five phases:

1) Bison Translocation (February 2017)

Translocate 16 bison (12 pregnant two-year-old females and 4 two-year-old bulls) from Elk Island National Park's herd to an 18-ha, enclosed soft-release pasture in the reintroduction zone. This is the recommended herd composition, as younger bison are more adaptable and likely to bond to new environments and would be easier to handle during the initial years of the project.

2) Soft Release Pasture (February 2017-June 2018)

Hold the animals in the fenced soft-release pasture for 16 months where they would be provided with water and supplementary feed. This approach would help the herd develop a strong bond to their new home. It is anticipated the cows would calve twice during this time, increasing the size of the herd to approximately 30 animals.

3) Fencing Construction (Summer 2017)

Install approximately 8 km of adjustable wildlife friendly fencing in 15 locations to discourage bison from leaving the reintroduction zone.

4) Free Roaming (July 2018-February 2022)

Release the herd from the soft-release pasture into the 1,892 km² reintroduction zone. Closely monitor the animals via GPS and radio collars. As necessary, Parks Canada would herd, haze, or bait the bison to help steer their movements to encourage the bison to develop an affinity for their new home range.

5) Assessment of Pilot Project

Evaluate 5-year pilot against project targets to determine if the bison reintroduction program should continue or if the pilot project needs to be reversed and animals and fences removed.

Project Location

The availability of sufficient, high quality bison habitat is key for successful reintroduction. An extensive, peer-reviewed habitat and carrying capacity assessment for BNP analysed bison habitat quality throughout the Park to determine which areas, if any, would provide suitable habitat for bison. The remote, grassy valleys of the eastern slopes of BNP were found to represent suitable habitat for the proposed reintroduction and could theoretically support hundreds of bison year-round.

The 1,189 km² reintroduction zone would be divided into three Bison Management Zones as per BNP's Bison Excursion Prevention and Response Plan (Figure 2). The goal is for bison to stay within the 354 km² Core Reintroduction Zone for the first 1-2 years so that they bond to their new home range, before gradually venturing into a further 329 km² of habitat in the Expansion Zones to the north and south. Should bison venture into the surrounding 506 km² Hazing Zone they will be actively herded, baited and/or hazed back into the Core and Expansion zones, primarily by staff on horseback using low-stress stockmanship techniques.

The entire reintroduction zone is declared as Wilderness under the Canada National Parks Act. This zoning ensures that the wilderness character of the area is maintained, with only non-motorized access permitted on the trails.

The reintroduction zone is also entirely surrounded by national park lands and is abutted by other national parks to the west, provincial protected areas to the southeast and northwest, and a Public Land Use Zone prohibiting motorized activity that extends for 15 km from the eastern BNP boundary to the Forestry Trunk Road (Figure 1). The nearest grazing allotments and active forestry areas outside of BNP occur approximately 20 km to the east of the reintroduction zone and the nearest private land begins 50 km east. The closest town (Banff, Alberta) and major highway (TransCanada) is approximately 20 km south of the reintroduction zone while the town of Sundre is located 90 km east (Figure 1).
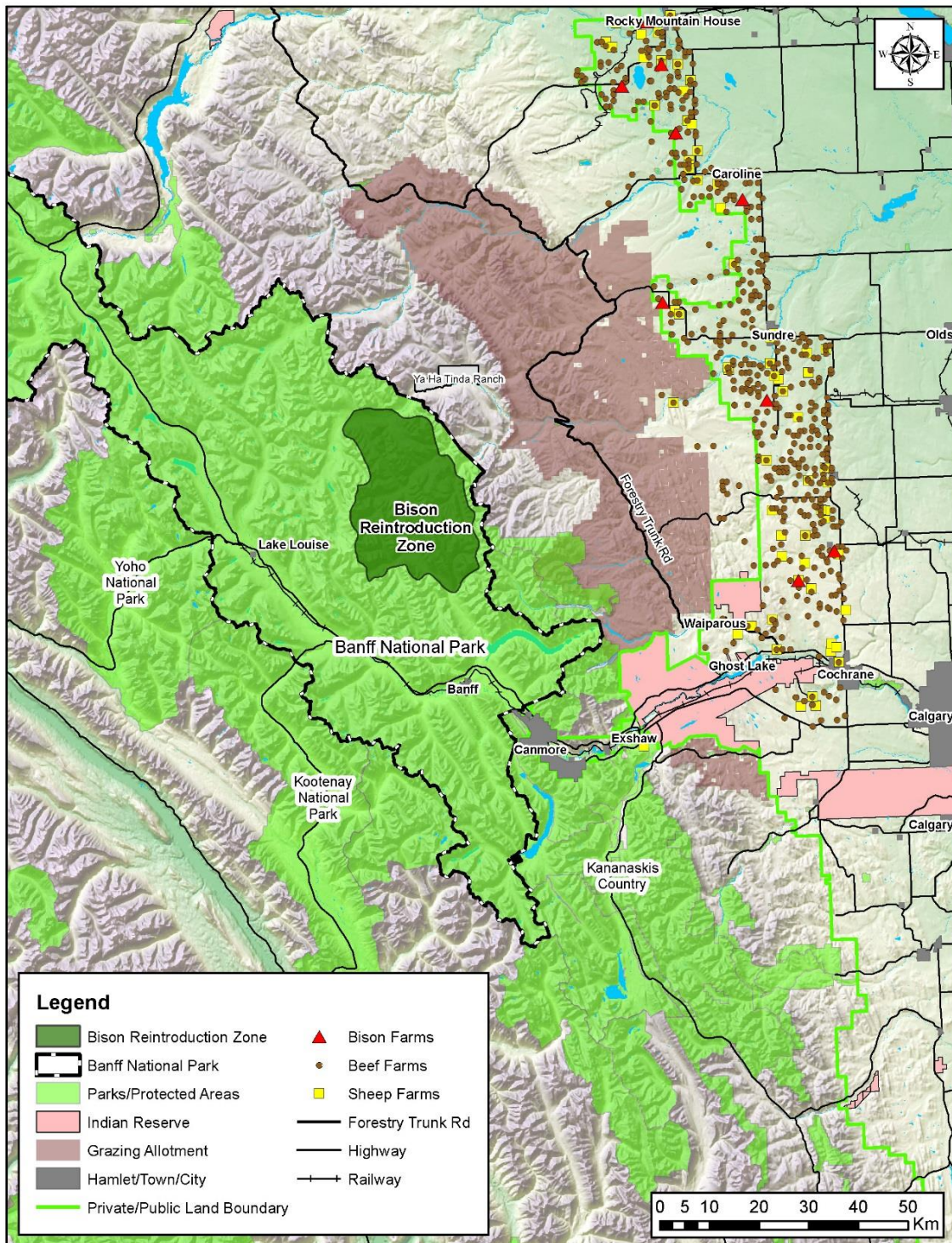
Figure 1*: Location of the Banff National Park Bison Reintroduction Pilot Project (nearest farms and ranches to the east of the reintroduction zone are indicated).*

Considerations

While BNP contains relatively large areas of wilderness with high quality bison habitat, certain parts of the Park, such as the Bow Valley corridor, experience high levels of human use. Further, the Park's eastern border is bounded by provincial lands used and managed for recreational and tourism purposes with more intensive industrial and agricultural uses occurring further east. Parks Canada recognises and respects that neighbouring land managers and organizations may have different priorities and mandates. Accordingly, given that bison roam in search of high quality habitat, special planning and actions have been built into the project to dissuade reintroduced bison from wandering into these areas and to manage any negative impacts should this happen during the course of the pilot project.

Key Concerns, Assumptions and Performance Objectives

Reintroducing a large mammal that has been absent for over 140 years comes with uncertainties, concerns and new opportunities, some of which have been expressed by stakeholders, Indigenous People and the public in two previous public comment periods. These comments have been carefully considered by Parks Canada in the development of the reintroduction plan. Appendix 1 summarises these concerns as well as others identified in this DEIA, along with the assumptions Parks Canada has made and the associated performance objectives it will use to evaluate those assumptions at the end of the 5-year pilot project.

Review of Detailed Environmental Impact Analysis

Potential impacts on identified valued components were considered for **supporting infrastructure** (i.e. wire fences) and **reintroduction activities** (i.e. capture and translocation of bison). An overview of each of these is described below, followed by a brief discussion of the major impacts, mitigations, and magnitude of impacts after mitigations.

Supporting Infrastructure

Overview

Approximately 8 km of wire fencing will be constructed in 15 sections ranging in length from 38 m long to 2.5 km long (Figure 2). Collectively these will help retain bison in the reintroduction area and supplement the natural containment provided by cliffs and rocky ridges. The use of minimal, strategic fencing will support other tools to help the animals develop an affinity to the reintroduction zone, including a 16-month soft-release holding period, meadow burning to maintain and enhance attractive habitat, and herding and hazing the bison on horseback while the herd is initially free-roaming.
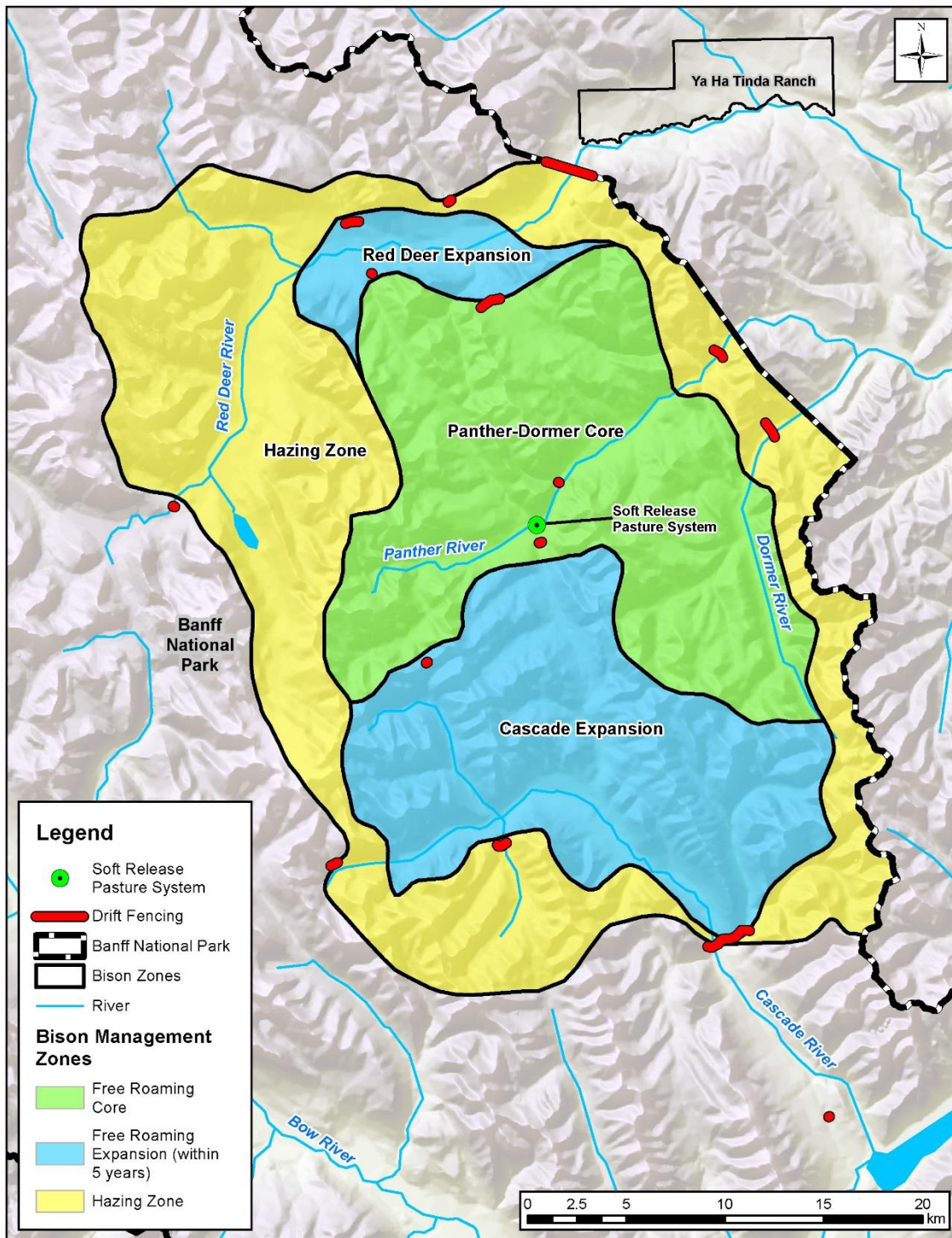
Figure 2*: Wire fence locations and Bison Management Zones in BNP bison reintroduction area.*

An adjustable fence design with two modes will be used to meet the dual needs of holding back bison, when required, while allowing for free passage of other wildlife at all other times. The proposed wire drift fence design has been informed by rigorous field testing in and adjacent to the reintroduction zone over the last 1.5 years.

The wildlife-permeable mode will be the default setting for fences (Figure 3). It consists of two groupings of double-stranded smooth wire at approximately 107 cm above ground (good for elk, white-tail deer and moose to jump over) and 76 cm above ground (good for bighorn sheep and mule deer to slide under). This design exceeds the latest standards for wildlife fence permeability in western North America.

Bison-holding mode will be the fence setting whenever bison are within 2 to 5km of a given fence. It consists of 5 strands of double-stranded smooth wire strung at approximately 150 cm, 130 cm, 105 cm, 80 cm, and 50 cm above ground (Figure 4).

The 80 cm wire will also be augmented with an electrified wire that can be enabled where habitat modelling suggests bison pressure could be greatest in winter.

Fence deployment between the two modes will be performed by staff, volunteers, and partners stationed at nearby patrol cabins and outfitter camps. Based on the quality of nearby habitat, the fences are collectively expected to be in bison-holding mode <5% of the time (fewer than 18 days per year, predominately in winter)

Where fences cross rivers or creeks, curtains of plastic chain or lightweight boards will be suspended over the watercourse to create a strong visual barrier that will discourage bison from moving through the area while still allowing for the free passage of water, fish, waterfowl, flood debris and watercraft (Figure 5). This is the type of design that is used successfully to contain bison at a river crossing in Grasslands National Park.

Gates will be installed at all park trails intersected by wire fences and will be closed when in bison-holding mode. Signs will be posted along the trail at each site explaining how the fences work and their necessity for bison restoration.

Figure 3: Remote camera image of cow elk going over Panther test fence in wildlife-permeable mode (Parks Canada).

Figure 4: Bison-holding mode, Red Deer test fence, BNP bison reintroduction zone, as per specifications recommended for Alberta grazing leases with bison.

Figure 5: Fence design for watercourses: plastic chain curtain on Panther River test fence in BNP.

Summary of Potential Impacts on Valued Components

Soil, Vegetation and Fire

Construction of the fences will be done by hand in summer 2017. Very few trees will be cut as they will be incorporated as fence posts and will be protected from fencing wire and staples by 1.5 m-long lengths of lumber affixed to their trunks. Where trees aren't available metal posts will be hammered directly into the ground, thereby minimizing disturbance of soil and ground vegetation.

Wildlife

The greatest potential impact of wire fencing after mitigations will be on regional wildlife movement when fences are in bison-holding mode. The intermittent nature of the disturbance and its expected short duration renders it low in magnitude.

Delivery of fencing materials and work crews to the various fence sites will require approximately 15.5 hours of helicopter time. Flight elevations of 500 m above ground level will be maintained except when landing to minimize disturbance to wildlife.

Species at Risk

Only 100 m of wire fencing occurs in the area previously used by the extirpated woodland caribou (southern mountain population), a SARA listed threatened species. Were woodland caribou to be reintroduced in the future it could impede their movements when in bison-holding mode. However, bison habitat modelling suggests this will occur infrequently due to the lack of nearby high quality bison habitat (1% of the time in summer and <2% of the time in winter for this particular fence). The magnitude of the impact on woodland caribou is therefore rated as negligible. No other SARA species are expected to be affected by supporting infrastructure for this project.

Cultural Resources

An Archaeological Overview Assessment was completed for the 5-year pilot bison reintroduction project based on previous archaeological surveys of the Red Deer, Panther, Dormer and Cascade river valleys. There are 155 known archaeological sites in the proposed bison release area but none are expected to be impacted by the proposed fences.

Conclusion

The magnitude of potential impacts of fencing to soils, vegetation, aquatics, visitor experience and socioeconomics were considered to be negligible. The overall adverse impact of fencing on all ecosystem components is therefore expected to be **insignificant.**

Reintroduction Activities
Capture and Translocation of Bison (February 2017)

Overview

Herd selection

Parks Canada proposes to select 16 healthy plains bison from Elk Island National Park (EINP) in January 2017. Twelve pregnant 2-year-old cows and four 2-year-old bulls will be taken from the larger herd via EINP's existing corral and chute system. Five of these animals will be fitted with GPS radio collars.

Quarantine and Transfer

The entire group will be held in EINP's quarantine pasture for 2 weeks. In addition to satisfying initial disease surveillance requirements, this 14-day period will permit the animals to adjust to new social hierarchies, adapt to the kind of hay and pellet feed they will receive in BNP's soft-release pasture, and begin to habituate to daily contact with humans and horses.

Once the two-week period is over the animals will be administered a veterinarian-approved calming agent (e.g. Halopurinal) and loaded into stock trailers and hauled overnight to Parks Canada's Ya Ha Tinda Ranch near the eastern boundary of BNP. Once at the ranch, the animals will be airlifted 25 km to the soft-release pasture while still in the stock trailers using a heavy-lift helicopter. Upon arrival, bison will be released into a 22 m-diameter catch pen to ensure they recover from the flight and do not require further attention before being released into the larger pasture system.

Bison will be handled throughout this process as per guidelines and principles set by Parks Canada's Animal Care Task Force. A qualified wildlife veterinarian will be on site for all capture and translocation procedures.

Summary of Potential Impacts on Valued Components

Soil, Vegetation and Aquatic Resources

All capture and translocation activities will occur outside of BNP on hardened ground at existing bison handling facilities in EINP and at the working corrals at the Ya Ha Tinda Ranch, none of which are close to water. No adverse impacts to soil, vegetation or aquatic resources are expected.

Wildlife

The largest impact of this phase of the project is likely to be stress on the bison themselves. This will be mitigated through the use of low-stress stockmanship techniques at EINP's handling facility, through the use of specially outfitted stock trailers that will reduce the chances of injury during ground and air transport, and through the use of a calming agent during all translocation activities. The services of a heavy-lift helicopter that can sling a stock trailer with bison inside will eliminate the need for another stressful transfer into individual crates or bags at the Ya Ha Tinda Ranch.

Bighorn sheep are the only wildlife expected to be along the flight path in winter (goat surveys show they are not present in the area). The potential impacts on sheep will be mitigated by ensuring it maintains minimum above-ground flight elevations of 500 m.

The magnitude of negative impacts on bison and sheep once these mitigations are in place is considered to be negligible given the short duration of the disturbance (approximately 12 hours of transport for the bison; total of 4-round-trip flights that may periodically fly over sheep).

No potential impacts are expected on species at risk, cultural resources, visitor experience (no visitors in this area in February) and socioeconomic dynamics.

Conclusion

The overall adverse impact of capturing and translocating bison is therefore expected to be **insignificant.**

Holding, Feeding and Conditioning Bison in Soft Release Pasture (February 2017 to June 2018)

Overview

Pasture System

The translocated bison will initially be held and rotationally grazed for 16 months in an existing 18-ha system of two soft-release pastures located in the Panther River Valley (Figure 2). Construction of this pasture system was assessed in a separate environmental analysis process. The primary of the two pastures (5.8 ha enclosed with 2.4 m-high page wire) will be used to hold and supplementally feed the bison during two winters and two spring calving seasons (2017/18). Natural forage will be supplemented with weed-free hay and minerals transported by helicopter and by horseback from the Ya Ha Tinda. An 11.9 ha subsidiary pasture (Pasture 2) will be fenced with the same adjustable 5-wire design described above. The native grasses within the larger subsidiary pasture will be grazed in summer and fall.

Feed

Hay will be delivered in square bales so as to easily be moved by hand. A quad and snowmobile will be used to help haul feed between pastures but will be restricted to the immediate vicinity of the Windy patrol cabin, tack shed, corral and Pasture 1. Where water is not accessible (Pasture 1) it will be pumped from the Panther River via portable fire pump and hose into a temporary trough every few days.

Monitoring and Care

Rotating shifts consisting of two Parks Canada staff and/or contractors and volunteers will stay on site at the Windy patrol cabin to feed, monitor and condition the animals for the 16-month soft-release pasture phase of the project. No upgrades are necessary to the cabin. Human waste will be contained in an existing outhouse pit located 100 m from the nearest open water (Wigmore Creek).

Conditioning

Staff will condition the bison to several stimuli while they are contained over the course of their 16-month stay in the soft-release pasture system. Such conditioning has been effective in reducing stress in captive bison elsewhere and will improve the effectiveness of herding techniques that will be used during the free-roaming phase of the project. The goal is to establish attraction and avoidance behaviours in the bison to help improve their manageability and prevent the risk of excursions from the reintroduction zone once they are free-roaming. This will be a short term, transitional strategy to encourage the initial group of animals to develop an affinity for their new home range and will help set the pattern of future herd movements. Subsequent generations are not expected to be subject to such conditioning.

Transportation

The remote location of the soft-release pasture requires that helicopters be used to support this phase of the project. Approximately 21 flights will be necessary to transport hay (flights of 20 minutes each) and 45 flights for weekly shift changes in winter (40 minutes each) for an estimated total of 37 hours of flight time. Parks Canada personnel will access the site on horseback and on foot in spring, summer and fall to minimize helicopter use and will periodically ski in and out in winter to help reduce reliance on helicopters.

Summary of Potential Impacts on Valued Components

Soil and Vegetation

The soft-release pasture system will be the centre of bison activity for 16 months of the pilot project and is likely to be where impacts of the project to soils and vegetation are greatest. The animals will be held at a much higher density (e.g. 190 animals/km^2) within the pasture system than during the free-roaming phase (e.g. 0.04 animals/km^2 in the larger reintroduction zone) and are likely to trample, horn and overgraze the willow and birch shrubs that are the predominant vegetation type in Pasture 1. Potential impacts to the soils and vegetation of Pasture 2 will be less intense as it is twice as big as Pasture 1 and will hold the animals for a quarter of the time. Riparian areas in Pasture 2 were scoured of most vegetation during the 2013 flood and now consist primarily of rock and gravel and are unlikely to be used much by the bison.

Long- term studies in other areas where bison occur show moderate grazing leads to substantial increases in forage productivity and quality not just for bison but for other animals. Bison's tendency to selectively feed on grasses over leafy plants, and preferentially feed on some areas, also leads to greater plant and habitat diversity. Such benefits may occur in Pasture 2.

Bison are also important vectors for seed dispersal via their fur and in their feces. This could be a positive impact in Pasture 2 where only native plants exist but could be negative in Pasture 1 where there is a small pre-existing infestation of non-native buttercup plants. This will be addressed through aggressive removal of buttercup flower heads prior to bison reintroduction and through targeted spraying after the soft-release pasture phase is over. Further introduction of non-native plants will be avoided through the use of second-cut weed-free hay (no viable seeds) that is sourced from the same supplier that Parks Canada has used without issue for several years.

Wildlife

Potential impacts to wildlife during the soft-release phase of the project could occur from: fencing; the unlikely event that bison introduce disease; increased human presence in the area; and increased helicopter activity.

The adjustable, wildlife-permeable fencing will be used for Pasture 2 and will enable free-passage of wildlife for 12 of the 16 months. Page wire fencing will exclude wildlife from Pasture 1 for the full 16 months but the impact is expected to be negligible due to its temporary nature, small extent (5.8 ha), and the number of alternative routes for wildlife to travel around the pasture.

A disease risk assessment was completed by the Canadian Wildlife Health Cooperative and estimated the risk of brucellosis or tuberculosis being introduced with bison into BNP to be low, given the animals would come from Elk Island National Park (certified brucellosis and tuberculosis-free by the Canadian Food Inspection Agency). Nonetheless, Parks Canada has committed to extensive disease monitoring for the project and will depopulate the herd in the unlikely event brucellosis or tuberculosis are detected. Protocols are also in place for several other unlikely diseases.

The majority of helicopter use will occur in winter when bears are hibernating and elk have migrated outside of the park. Minimum flight elevations of 500 m above ground level will be maintained to minimize disturbance to bighorn sheep. Goats are not common along planned flight routes.

Full-time staff presence is likely to have a localized and temporary (16-month) negative impact on shy and wary animals like grizzly bears and wolves. A number of well-used wildlife trails provide a variety of alternative routes for them to travel around the area. The extent of displacement is expected to be very localized (i.e. 2 km²) within home ranges that often exceed 1,000 km².

Staff access to and from the site by foot and horseback in spring, summer and fall could also disturb these species. Given the low levels of existing human use on these trails, however, such access is not expected to approach any thresholds whereby these animals may abandon the area. The overall impact to large carnivore habitat security is therefore expected to be negligible.

Aquatics

Increased sediment and nutrient loads to the Panther River are possible during the 4-month period bison have access to the river within Pasture 2. Sedimentation of the water can occur when bison create trails into the river, however in other areas where this has happened, the impacts have been found to be localized. Bare ground from bison wallowing and horning behaviour can also have a negative impact but, due to the extent of scouring from the 2013 flood, very little soil is available to be mobilized in the riparian area of Pasture 2. Manure build up in the riparian area and a resultant flush of nutrients into the river are also unlikely given the unattractiveness of the scoured riparian zone to bison. Nonetheless, weekly surveys of the riparian zone will be conducted while the bison are in Pasture 2 and all manure in excess of 1 pile/2 m² in riparian areas will be moved to higher ground by staff.

Cultural Resources

One historical campsite falls outside of the Pasture 2 fence. No other cultural sites are known to exist in the area.

Visitor Experience

In summer 2017, a bypass trail will allow the few horse riders and backpackers using the area to continue to access all trails. On-site staff caring for the bison would explain any temporary losses to wilderness experience within the context of long-term species restoration.

No impacts to socio-economic dynamics are expected.

Conclusion

Given the above mitigations, the overall adverse impact of the operation of the soft-release pasture is expected to be **insignificant.**

Free-Roaming (June 2018-2022)

Overview

After two calving seasons in the soft-release pasture the original herd of 16 translocated bison will grow to approximately 30-35 animals, half of which would have been born on site. They would be accustomed to being herded by Park Canada staff by this time; would have learned to respect the wire fencing that they may encounter in key areas; and would be accustomed to crossing rivers and feeding on natural forage.

Prior to being released into the larger 1,189 km² reintroduction zone in June 2018, approximately ten bison would be chemically immobilized and fitted with GPS and radio collars to ensure at least one-third of the herd can be monitored from a distance. The gates to the soft-release pasture will then be opened.

Management Actions as Required

Given the availability of good quality year-round habitat and the management efforts identified to retain bison in the reintroduction zone, it is assumed the bison will remain within the Core and Expansion areas and use the habitat in proportion to its estimated suitability. In the event that bison move outside of the reintroduction zone, management actions, as well as their urgency, will increase appropriately as per the BNP Bison Excursion Prevention and Response Plan. In extreme cases, and when all other options have failed, bison may need to be put down.

Summary of Potential Impacts on Valued Components

Soil, Vegetation and Aquatic Resources

The extremely low density at which bison will occur in the reintroduction zone during the 3.5-year free-roaming phase of the project (0.04 animals/km²) is expected to result in negligible impacts on soil, vegetation, and aquatic components of the ecosystem. The exception to this would be if the animals concentrate their movements and activities to very few localized riparian areas, which is unlikely given the scoured nature of the riparian area.

Wildlife

Impacts to wildlife and regional socioeconomic dynamics would occur if bison introduced disease to wild or domestic animals but such impacts are highly unlikely given 40+ years of good health assessments of the source herd in Elk Island National Park. Nonetheless, the bison selected for reintroduction will be tested, quarantined and monitored for disease and health issues for 16.5 months prior to becoming free-roaming. Their health will also be assessed during the free-roaming phase of the project by way of twice-yearly ground surveys. All bison mortalities will also be investigated. In the unlikely event that brucellosis or tuberculosis are detected, the entire herd will be depopulated.

Helicopter use is expected to decrease dramatically once the bison are free-roaming (average of 0.5 hours/month) and will be limited to emergency flights to locate bison or to investigate mortalities. As with other phases of the project, minimum flight elevations of 500 m above ground will be maintained to minimize disturbance on sheep and other wildlife.

Cultural Resources

Three high-vulnerability archaeological sites will be proactively fenced in the Red Deer River Valley to prevent damage by free-roaming bison. Other moderately vulnerable archaeological sites will be monitored every two years to assess for possible newly exposed artefacts.

Visitor Experience

The risk of reintroduced bison injuring visitors is similar to the current risk posed by elk, bears or other species or natural hazards already in BNP. Like other wild species, individual bison can be aggressive in the rare occasion when they are surprised, when they feel trapped or cornered, when males are in rut, and when females are defending their young. Very few such encounters prove serious in other sites with bison like Elk Island and Prince Albert national parks. Despite tens of thousands of visitors interacting with bison in the frontcountry and backcountry areas of these parks, there have been fewer than half a dozen incidents involving human injury in the last 15 years. On the rare occasion when there is a conflict, it tends to involve bicyclists surprising bison on trails. None of the trails in the Banff bison reintroduction zone currently allow bicycles and all but one see fewer than 200 hikers/horseback riders per year. As part of this reintroduction, Parks Canada will conduct extensive education programs before and during all years of the reintroduction to help prepare visitors for a safe visitor experience in bison country.

As with BNP's elk and bear management programs, bison management may sometimes be required. Actions may range from proactive education and posting area warnings/closures to hazing or even removing bison from a conflict situation.

Socioeconomic Dynamics

Bison could damage fences and other private property if they leave the reintroduction zone and travel 20-50 km to the east but this is unlikely given the combined effect of the described reintroduction techniques, GPS-enabled radio collars and protocols in place to respond to any excursions that do occur.

Similarly, there are concerns that bison could introduce disease to livestock that is 20-50 km east of the reintroduction zone but this, too, is unlikely given the source herd in Elk Island National Park has been used, without incident, for dozens of bison reintroductions elsewhere in the world and the health monitoring protocols that will be in place.

Conclusion

Given the above mitigations, the overall adverse impact of free-roaming bison on all valued components during the course of the 5-year pilot project is expected to be **insignificant.**

Cumulative Impacts

Cumulative impacts are changes to the biophysical, social, economic, and cultural environments caused by the combination of past, present and foreseeable future actions.

Long-term Bison Restoration

The magnitude for most potential impacts of free-roaming bison for the 5-year pilot project are considered to be negligible, largely because of the low densities of bison. Should longer-term bison restoration proceed beyond the pilot project, those densities could increase to levels where the cumulative positive and negative impacts become more pronounced and potentially more significant. For example, based on bison population dynamics elsewhere, the 16 bison reintroduced to BNP in 2017 could grow to 200 animals within 10 years.

Examples of positive impacts from higher bison densities include:

- ➢ Increased plant diversity and productivity due to the grazing effects of bison;
- ➢ Maintenance and expansion of meadow habitat for other species due to the horning and rubbing behaviours of bison;
- ➢ Increased insect diversity and biomass supported by bison for consumption by insectivorous birds and bats;
- ➢ Additional food source for predators and scavengers;
- ➢ Additional amphibian habitat due to ephemeral ponds created by bison wallows; and
- ➢ Improved nestling survival due to the availability of bison fur for nesting birds.

Negative cumulative impacts could include:

➢ An increase in predators that results in increased predation on endangered caribou, should they be reintroduced into the park, or other ungulates;
➢ Damage to riparian vegetation and stream habitat due to the trampling, wallowing and grazing impacts of higher densities of bison if they favour such habitats; and
➢ Competition between bison and other ungulate species should food and space become limited.

A goal of the pilot project is to assess the response of various ecosystem components to the reintroduction of very few bison in order to determine long-tern population targets should further bison restoration proceed (see Monitoring section below).

Prescribed Fire

Several prescribed fires over the last 30 years have resulted in approximately 11% of the reintroduction zone (126 km²) being burned since 1980. This is high compared to the rest of the park and is approaching the historic fire regime. This has resulted in less fuel, more open areas, and higher habitat heterogeneity than adjacent valleys, making the area better for bison and other grazers.

The continued application of prescribed fire, particularly meadow burning, is an integral component of the pilot bison reintroduction project to enhance habitat and help attract and hold the bison within the reintroduction zone. A separate environmental analysis was completed for meadow burning throughout the park and 865 has of meadow burning was completed in 2015 in the reintroduction zone in anticipation of bison arriving. A further 635 ha of meadow burning is planned in and around the soft-release pasture over the course of the next three years.

There are several anticipated cumulative impacts from bison and prescribed fire, especially if long-term bison restoration proceeds and bison densities increase. **Examples of positive cumulative impacts from these two activities include:**

➢ The prevention of bison excursions from the reintroduction zone through the creation of more attractive habitat;
➢ Increased habitat heterogeneity and biodiversity;
➢ Increased forage quality, quantity and palatability for not only bison but other native grazers like elk and bighorn sheep.

Negative impacts may include:

➢ Prescribed fire applied outside of the reintroduction zone could attract bison out of the area;
➢ The combined impacts of bison trampling, wallowing and grazing in riparian areas, along with temporary removal of vegetation by fire, could lead to bank erosion, sedimentation of streams and rivers, and decreased fish habitat quality.

The risk of bison being attracted outside of the reintroduction zone due to fire can be mitigated by coordinating prescribed fire activities with neighbouring land jurisdictions. Long-term bison population targets, to be determined at the end of the 5-year pilot project, will mitigate damage to riparian and aquatic ecosystem components.

Monitoring and Assessment

A suite of project targets and monitoring measures is presented in Appendix 1. All monitoring measures were created in response to stakeholder concerns and knowledge gaps. These will be used to evaluate the 5-year pilot reintroduction project when it ends and to determine if it should be reversed or longer-term bison restoration should continue. If the decision is to reverse the project, all bison and fences will be removed. If the decision is to continue with longer-term bison restoration, then a comprehensive bison management plan, complete with population targets, will set the parameters for how it proceeds.

H2

Conclusions

In considering bison re-introduction, Parks Canada has the opportunity to assess the feasibility of restoring one of only two missing species of a relatively undisturbed and intact mountain ecosystem. In doing so, it could make an important contribution to the natural integrity of ecosystems of Banff National Park and global conservation of plains bison.

There are challenges and constraints that make the endeavour complex, not the least of which is undertaking the pilot project in a remote, backcountry setting, and the need to limit the movements of the largest land mammal in North America. Doing so results in possible disturbance to other wildlife. As the detailed environmental impact analysis demonstrates, the extent of these and other impacts are considered insignificant after mitigations.

The cumulative impact analysis considers the potential adverse impacts of this 5-year pilot project in the context of potential future ecological gains if longer-term bison restoration proves feasible. Expected benefits include improved grazing for other ungulates due to the fertilized grasses bison leave in their wake, more forest openings for meadow-loving birds and small mammals, more amphibian habitat due to bison wallowing, and more conversion of grass into protein when bison die and are consumed by scavengers and predators like wolverines and grizzly bears. Persistence of these benefits over time relies on the long-term management of population numbers. During the proposed 5-year pilot project, extensive herd monitoring will help establish population targets for the future if longer-term bison restoration proves feasible and proceeds.

Appendix ES-1: Key concerns, assumptions, supporting evidence, monitoring measures and project targets for BNP's 5-year pilot bison reintroduction.

Key Concerns	Primary Assumption	Secondary Assumptions & Supporting Evidence	Section of DEIA	5-year Monitoring	Performance Objectives
Bison may roam onto provincial lands.	Bison will remain within the reintroduction zone.	➢ 16 months and calving in soft–release pasture will result in strong bonding to new home. ➢ Meadow burning will help to attract/hold bison. ➢ Bison will respond to herding/hazing once free-roaming. ➢ Fences will work when in bison-holding mode and will be deployed in a timely manner as bison approach. ➢ A subset of the bison will be marked with GPS radio collars to enable close monitoring of their movements. ➢ There is suitable habitat to support bison within the park in both summer and winter. ➢ An Excursion Prevention and Response Plan is in place in the unlikely event excursions occur (Appendix 1).	App. 1	➢ Home range movements and habitat selection. ➢ Number and duration of excursions outside reintroduction zone. ➢ Hectares of meadows burned. ➢ Bison selection of recently burned meadows. ➢ Number of times bison move past fences.	➢ No bison excursions outside of the reintroduction zone. ➢ 1,500 ha of meadows burned. ➢ Bison do not move past fences.
Bison may be infected with tuberculosis or brucellosis.	Bison brought from Elk Island National Park (EINP) will be free of brucellosis and tuberculosis.	➢ EINP bison herd certified brucellosis and tuberculosis-free by Canadian Food Inspection Agency since the 1970s. ➢ Dozens of other reintroduction projects have used EINP plains bison without issue. ➢ The probability of bison being infected with these diseases is low. ➢ Parks Canada will conduct intensive surveillance of bison health, with response protocols in the unlikely event disease is detected.	App. 2	➢ Bison health and disease surveillance as per BNP Bison Health and Disease Monitoring Plan.	➢ No brucellosis or tuberculosis introduced by bison or detected in any species.
Bison may create safety hazards for people travelling by horseback, foot or ski.	Risks to visitors will be similar to other large mammals – e.g. elk and bears – in the Park	➢ BNP is a world leader in human-wildlife coexistence and will prepare visitors for bison with appropriate education, warning signs, etc. ➢ Very low visitation in BNP reintroduction zone (~200 people/year); users tend to be experienced backcountry travellers. ➢ Bison and visitors coexist in several other sites with higher visitation (e.g. Elk Island National Park).	Section 4.6	➢ Number and type of bison-human conflicts.	➢ Education, outreach and management actions result in very few bison-human conflicts; none result in serious injury.
Fences for bison may affect the movements of other wildlife, especially elk and sheep.	Fences will have 2 modes: wildlife-permeable and bison-holding. They will be deployed in bison-holding mode <5% of the time.	➢ Wire height and spacing for the 2-wire, wildlife-permeable mode exceed the latest North American standards for wildlife-friendly fencing and have been tested in BNP for their permeability to other species in 2016.	Sections 3.3 and 4.2	➢ % time fences in bison-holding vs wildlife-permeable mode. ➢ Safe passage by other wildlife.	➢ Fences will collectively be in bison-holding mode <5% of the time. ➢ No wildlife are seriously injured by bison fence.

Key Concerns	Primary Assumption	Secondary Assumptions & Supporting Evidence	Section of DEIA	5-year Monitoring	Performance Objectives
Bison may compete with other ungulates, especially elk and sheep.	Bison provide benefits for other ungulates.	➤ Bison grazing increases plant productivity and palatability for other grazers (e.g. elk and sheep). ➤ Bison prevent encroachment of trees and shrubs into meadows, thereby increasing grazing habitat for other grazers like elk and sheep. ➤ Meadow burning will promote attractive forage for all large herbivores. ➤ Competition is unlikely due to the small number of reintroduced bison and low elk and sheep numbers.	Section 4.2	➤ None as changes will not be evident in 5-year span of pilot project.	➤ N/A
Bison may introduce and spread non-native weeds	Bison will not introduce/ spread non-native weeds except in soft-release pasture where aggressive treatment of existing tall buttercup will occur.	➤ Parks Canada has identified 10 small existing non-native plant infestations in the 1,189 km² reintroduction zone (9 consisting of tall buttercup and one of Canada thistle). ➤ They are located in high quality bison habitat but their extent is so small, and the number of bison so few (0.04 animals/km²) as to render further spread by bison unlikely. ➤ The one exception is the soft release pasture. Weed-free hay will be used and aggressive treatment of existing buttercup will occur before bison arrive followed by aggressive rehabilitation of soil/vegetation afterwards.	Section 4.3	➤ Number and area of non-native vegetation infestations assessed biannually. ➤ Bison home ranges and habitat selection.	➤ No net increase in number and extent of infestations attributable to bison.
Bison may prefer and potentially damage riparian habitats	Bison will not preferentially spend time in riparian habitat	➤ Research from elsewhere shows that bison do not preferentially use riparian habitats.	Section 4.3	➤ Bison habitat selection	➤ Bison will not preferentially select and unduly damage riparian habitat.
Bison re-introduction may negatively affect water quality	Water quality will not diminish due to bison reintroduction or meadow burning.	➤ Bison do not tend to linger around water or in riparian areas. ➤ Negative impacts of prescribed fire on water quality are minimal and short-lived.	Section 4.4	➤ Benthic macroinvertebrate sampling as per the Canadian Aquatic Biomonitoring Network. ➤ Water chemistry sampling in bison reintroduction zone and other valleys for comparison.	➤ Maintenance of benthic macroinvertebrate communities indicative of good water quality. ➤ No net increase in sedimentation.
The reintroduction of bison may lead to higher numbers of wolves which will affect other prey species.	No numeric response of wolves to bison reintroduction.	➤ Experience elsewhere shows wolves often take years to adapt to a new prey source. ➤ The number of bison will be small during the 5-year pilot reintroduction. ➤ Bison are extremely robust to predation and often inflict injuries on wolves.	Sections 4.2 and 4.5	➤ Investigate all bison mortalities. ➤ Continue monitoring wolves with radio collars and remote cameras.	➤ Assess response of predators to bison during 5-year pilot. ➤ Set bison population target if restoration proceeds.

Key Concerns	Primary Assumption	Secondary Assumptions & Supporting Evidence	Section of DEIA	5-year Monitoring	Performance Objectives
Increased helicopter use for bison management, as well as greater human presence, will lead to reduced grizzly bear habitat security and sense of wilderness.	After an initial increase, helicopter and staff presence in reintroduction zone will decrease annually as bison settle into their new home.	➢ Translocation and soft-release pasture phases will be the most staff and helicopter intensive parts of the project. ➢ Significant increase in public use of the area is unlikely due to remoteness of reintroduction zone.	Sections 4.2 and 4.7	➢ Helicopter hours in the eastern slopes of BNP. ➢ Staff presence in Wilderness Zone. ➢ Number of people on trails in reintroduction zone.	➢ Reduction in helicopter use (<2.5 hrs/month) and staff presence (<2 wks/month) in Wilderness once bison are free-roaming. ➢ Backcountry visitation remains <100 events/month on all trails that are currently below that threshold.

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Backgrounder
Plains Bison Reintroduction to Banff National Park

Introduction

As a world leader in conservation, Parks Canada manages some of Canada's greatest natural heritage treasures and is committed to protecting these places and ensuring they remain healthy and whole. Integral to this work is restoring the full suite of native species to the lands and waters that make up the national park system. This helps ensure that these places will be here for present and future generations to appreciate and experience.

In 2017, Parks Canada would like to add a new chapter to our conservation story through the reintroduction of plains bison to Banff National Park.

Parks Canada proposes to reintroduce a small herd of plains bison into Banff's eastern slopes, a remote wilderness area that provides the wide, grassy valleys that bison need to thrive. Bison reintroduction would return a native species to Banff National Park and create new opportunities to reconnect Canadians and visitors with this iconic animal.

The five-year reintroduction project is a small-scale initiative that would inform future decisions regarding the feasibility of managing a wild bison herd in Banff National Park over the long-term. Reversible and adaptive, this project would build on Parks Canada's commitment to work collaboratively with Canadians while giving bison a brighter future in Canada.

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Why Bring Bison Back to Banff National Park?

The goal of this reintroduction is to restore a wild, free-roaming bison population to Banff National Park in a way that supports ecosystem integrity, enriches visitor experience, renews cultural connections, and enhances learning and stewardship opportunities.

Parks Canada is proposing to bring wild bison back to Banff National Park for several reasons:

Ecological Restoration
Bison are dominant grazers that once shaped the valleys and grassy slopes in what is now Banff National Park. As "ecosystem engineers," they influence the landscape in ways that benefit many plant and wildlife communities.

Inspiring Discovery
Experiencing a natural landscape with a full range of native species makes a national park visit authentic and distinctive. Successfully reintroducing bison will create new opportunities for visitors, neighbours and the public at large to learn about bison's ecological and cultural importance.

Cultural Reconnection
Bison are an icon of Canada's history. They were an integral part of the lives and livelihoods of Indigenous people and Canada's pioneers, and they still play an important role in the culture of Indigenous people. Restoring bison to the landscape is an opportunity to renew cultural and historical connections.

The History of Bison

For thousands of years, the North American plains rumbled with the hoof-steps of vast herds of bison. As migratory grazers, bison also wandered into the mountains and shaped the montane and sub-alpine ecosystems of what is now Banff National Park.

Reminders that bison once roamed the park are all around us. You can still stumble across the bones of these iconic creatures in the park's valleys. Looking from the ridge tops down into Banff's grassy meadows you can see bison wallows – earthen depressions created by these large animals rolling on the ground – markings so obvious that it is difficult to believe that over a century has passed since they last held a bison.

Their herds numbered as large as 30 million, but bison nearly went extinct within a single human lifetime due to overhunting. As a result, bison haven't grazed the valleys of Banff National Park since before the park was established in 1885.

Thanks in part to the foresight of Howard Douglas, an early Banff National Park superintendent, and the efforts of one of Banff's early citizens, Norman Luxton, bison were given a second chance when the Government of Canada purchased one of the last herds of surviving bison from a Montanan rancher in the early 1900s.

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Since that time, Parks Canada has played an important role in the global recovery of the species. For a century, Banff National Park protected a small display herd of bison in a paddock at the base of Cascade Mountain until the herd and the surrounding fences were removed in 1997 to facilitate wildlife movement of other species around the outskirts of the Town of Banff.

Though few plains bison herds are free-ranging today, most bison in Canada can trace their ancestry back to that rescued herd. Their direct descendants, now living in Elk Island National Park, provide healthy seed animals for bison reintroductions at home and around the world.

Modern Context

Times have changed since bison once traveled through the Banff area. Today, Banff National Park includes a town, national road and rail corridors, and tourist facilities that host more than 4 million visitors a year. After such a long absence, has the time of bison in Banff passed?

Great herds of bison no longer migrate across North America as they once did, but their absence is felt in the ecological and cultural communities that once depended on them. Now present on less than 0.5% of their historical range, few wild and free-roaming plains bison herds remain across North America. Testing the feasibility of managing bison in Banff over the long-term could contribute to the recovery of the species by leading to the creation of a new wild herd.

The timing of the proposed return of bison to Banff coincides with conservation initiatives that provide a foundation for bison reintroduction within the park. This includes a prescribed burn program to restore productive grassland habitats and the presence of the bison's natural predators - wolves and grizzly bears.

Bison Reintroduction to Banff National Park

For the pilot project, a small herd of bison would roam a core reintroduction zone spanning 1,189 km^2 of the eastern slopes of Banff National Park. The Panther and Dormer River Valleys would form the core of the reintroduction zone while portions of the Red Deer and Cascade River Valleys would be included after the first few years of the free-roaming phase.

Following an evaluation, Parks Canada would decide whether to maintain the project, expand the vision or withdraw from the initiative.

Soft-Release
Like many reintroduction projects, the success of the Banff reintroduction would initially require a hands-on approach. In early 2017, a small herd of disease-free bison from Elk Island National Park would be transferred to an enclosed pasture system within the reintroduction zone where they would remain for several months. Called a "soft-release", this approach is a common practice for reintroduction programs, as it helps the animals bond with their new home.

During their time in the soft-release pasture, Parks Canada would condition the herd both positively and negatively to a range of cues. Conditioning tools include food rewards and gentle natural stockmanship techniques to ingrain certain bison behaviours that can be used to manage the herd as needed once the animals are free-roaming. Working with the bison to establish these behaviours at the outset of the project will set the patterns that are vital to

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helping them navigate and use the landscape for generations to come.

Free-Roaming
After 16-18 months, Parks Canada would open the pasture gates, allowing the young bison to explore the full reintroduction zone. Throughout the lifetime of the project, a combination of natural barriers and short stretches of wildlife-friendly fencing would discourage bison from leaving the reintroduction zone while allowing other wildlife to pass freely.

Despite comprehensive preventative measures to maintain bison within their new home, bison may occasionally wander beyond the reintroduction zone. Parks Canada would respond quickly to any reports of bison excursions and use a combination of herding, gentle hazing and baiting techniques to bring them back.

Bison Health
Ensuring the health of the herd and surrounding ecosystems is of top priority for Parks Canada. The probability of bison introducing or contracting diseases like bovine tuberculosis was assessed as "negligible-to-low", but due to the potential negative impacts associated with these diseases, Parks Canada has developed a *Bison Health Monitoring and Disease Response Plan.* This plan was developed in coordination with provincial authorities and will guide bison health activities throughout the pilot project.

On-going activities to preserve and monitor the health of the herd include:

- Obtaining the initial bison from Elk Island National Park, a bovine tuberculosis and brucellosis-free area for more than 40 years, that provides healthy seed animals to conservation projects across their historic range.
- Adopting strict bio-security protocols including: regular disease monitoring and immediate follow-up of any symptoms by a veterinarian.
- In the unlikely event that disease is detected, activating disease response procedures.

Detailed Environmental Impact Analysis

A detailed analysis of all the potential positive, neutral and negative impacts of the project is key to determining if and how the Bison Reintroduction Pilot Project should proceed. Consequently, Parks Canada is undertaking a detailed environmental impact analysis (DEIA) of the project.

The DEIA will consider the predicted influence of bison over the five-year span of the pilot project, with respect to specific valued ecosystem components, visitor experience and safety, socio-economic dynamics and cultural resources.

In fall 2016, Parks Canada will make this analysis available to the public. Public feedback on any concerns or opportunities that may have been missed or not fully considered by the project team will help inform any needed revisions to the DEIA.

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Involving Canadians

Parks Canada values and welcomes the perspectives and involvement of others in our programs and projects. Engaging Canadians in the bison reintroduction project has been a key element since it was first introduced during the 2010 *Banff National Park Management Plan* consultations, where it received overwhelming support. Parks Canada has continued to involve key stakeholders, Indigenous groups and the general public throughout the development of the bison reintroduction plan and now in the detailed environmental impact analysis review process.

Parks Canada will continue to support and develop opportunities for Canadians and visitors to connect with the bison reintroduction through a variety of means, including volunteerism, stewardship, interpretive and virtual experiences.

Next steps

At the close of the public review period of the detailed environmental impact analysis, Parks Canada will carefully review and analyze all comments received. A summary of the feedback received will be posted on the Banff National Park website.

A Determination of Impacts for the project will be made based on the final DEIA. This Determination of Impacts, along with public comments received throughout the project, and

any other relevant information, will be considered by the Superintendent in making a final decision about whether and how the project may proceed.

Canadians are invited to submit comments via email (opinion@pc.gc.ca), by mail (Kendra VanDyk, Consultation Officer, Parks Canada Land Use and Planning, Box 900, Banff, AB T1L 1K2) or by phone (403-431-1604).

Want More Information?

Visit: parkscanada.gc.ca/Banff-bison

Or contact:
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Frequently Asked Questions
Reintroduction of Bison to Banff National Park

Background

For thousands of years, vast herds of plains bison roamed the prairies and the eastern slopes of the Continental Divide, including the area that is now Banff National Park. By the mid-1800s, hunting had nearly driven them to extinction. Today, only a few small herds of wild, free-roaming plains bison remain.

The 2010 Banff National Park Management Plan gives direction to "Reintroduce a breeding population of the extirpated plains bison, a keystone species that has been absent from the park since its establishment…" In 2017, as part of national conservation efforts, Parks Canada proposes to reintroduce a small herd of wild plains bison to Banff National Park. This five-year pilot project would be a small-scale initiative to inform future decisions regarding the feasibility of managing a wild bison herd in the park over the long-term.

Q: Why do you want to bring Bison back to Banff National Park?

A: Reintroducing bison to Banff, part of their historic range, is an important step towards restoring the full diversity of species and natural processes to the park's ecosystem; their return would also provide new opportunities for Canadians and visitors to connect with the story of this iconic species. More specifically:

Ecological and Conservation Benefits
Bison are dominant grazers that once shaped the montane and subalpine ecosystems in what is now Banff National Park. As "ecosystem engineers," they influence the landscape in ways that benefit many plant and wildlife communities. The project is also an opportunity to support global bison conservation efforts, by re-introducing a bison to one of the few remaining areas where natural selection can operate. The continuance of such predation pressure, along with unmitigated exposure to extreme weather and other natural factors, is critical to the long-term vigor of the subspecies.

Inspiring Discovery
Experiencing a landscape with a full range of native species is what makes a national park visit authentic and distinctive. Successfully restoring bison would provide opportunities for visitors, neighbours and the public at large to learn about bison's ecological and cultural importance.

Cultural Reconnection
Bison are an icon of Canada's history. They were an integral part of the lives and livelihoods of Indigenous people and Canada's pioneers, and they still play an important role in the culture of Indigenous people. Restoring bison to the landscape is an opportunity to renew cultural and historical connections.

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Q: Where are you proposing to reintroduce bison?

A: For the scope of this pilot project, a small herd of bison would roam a reintroduction zone spanning 1,189 km^2 in the eastern slopes of Banff National Park, a remote wilderness area that provides the grassy valleys that bison need to thrive. The Panther and Dormer River Valleys make up the core of the area with portions of the Red Deer and Cascade River Valleys as expansion zones within the first few years of the free-roaming phase. Based on a recent habitat analysis, this area would provide ample habitat for both summer and winter grazing.

Q: What would the reintroduction to Banff look like?

A: Parks Canada is proposing a reversible five-year pilot project to test the feasibility of managing a wild herd of bison in the long-term. Following an evaluation at the conclusion of the pilot, Parks Canada would decide whether to maintain the project, expand the vision or withdraw from the initiative.

Like many reintroduction projects, the success of a Banff bison reintroduction would require an adaptive, phased approach:

- In early 2017, a small herd of disease-free bison from Elk Island National Park would be transferred to an initial 'soft-release' enclosed pasture within the reintroduction zone located in Banff's eastern slopes. The herd would remain there for several months to bond to their new home.
- After several months, Parks Canada would open the pasture gates, allowing the young animals to explore the full reintroduction zone landscape.
- Throughout the lifetime of the pilot project, a combination of natural barriers and short stretches of wildlife-friendly fencing would discourage bison from leaving the reintroduction zone while allowing other wildlife to pass freely.
- Parks Canada would monitor the herd and its influence on the landscape throughout the lifetime of the project to inform management decisions.
- A population target has not been established for this pilot project; any future targets would be determined following on-going monitoring of the herd.

Q: How would you keep bison from leaving the reintroduction zone? What happens if they escape?

A: Parks Canada is proposing a comprehensive approach to encourage bison to remain within the core reintroduction zone and to address any excursions should they happen. This includes:
- Using a "soft-release" approach by holding the herd in an enclosed pasture system in the reintroduction zone for 16-18 months, to allow the herd to calve in the enclosure and develop connection to their new home.
- Using a combination of natural barriers complemented by minimal stretches (approximately eight km) of wildlife permeable fencing.
- Identifying all bison released in the park with numbered ear tags. A subset of the herd will also be fitted with satellite linked GPS collars for tracking purposes.
- Responding quickly to reports of bison excursions from the reintroduction zone and using herding, gentle hazing and baiting techniques to bring them back.

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- Continuing to involve neighbouring landowners and stakeholders in the development and refining of our bison excursion protocols.

Q: What kind of fencing would you use? Would it impact movement of other wildlife?

A: Bison would share their new home with other native species, including bighorn sheep, elk and bears. To discourage bison from leaving the reintroduction zone while allowing other wildlife species to cross freely, Parks Canada is proposing wildlife-friendly fencing that complements natural topographic barriers.

To determine an ideal design, Parks Canada completed a year of fence design testing at key locations in the reintroduction zone. Based on the findings, Parks Canada proposes an adjustable wire fence that exceeds all standards for wildlife-friendly fencing elsewhere in North America. As a result, major disruptions to natural wildlife movements are not expected.

Q: If the bison are fenced, are they still considered "wild"?

A: Parks Canada would implement short stretches of wildlife-permeable fencing to maintain bison within the reintroduction zone which spans 1189 km^2 of Banff's most remote wilderness. Bison would be allowed to roam widely in this area which is more than six times larger than their original home at Elk Island National Park. Within this area, bison will be fully part of the ecosystem and subject to predation pressure, along with unmitigated exposure to extreme weather and other natural factors.

If bison are reintroduced to Banff National Park, they would be classified as "wildlife" under the National Parks Act and Regulations and would be afforded the same protection as elk, moose, grizzly bears and other species.

Q: How can you be sure that introduced bison won't carry disease?

A: The likelihood of bison introducing or being exposed to diseases such as bovine tuberculosis, brucellosis or anthrax in Banff National Park is estimated to be negligible-to-low. However, due to the potential negative impacts associated with these diseases, Parks Canada developed a *Bison Health Monitoring and Disease Response Plan* in coordination with provincial authorities to guide bison health activities throughout the course of the pilot project.

In the development of this plan, Banff National Park is drawing from over a century of Parks Canada's bison management experience.

Key components of the plan include:

- Releasing only disease-free bison into Banff National Park. The animals would be obtained from Elk Island National Park, a brucellosis and bovine tuberculosis-free area for more than 40 years.
- Adopting strict bio-security protocols including: regular disease monitoring, immediate follow-up of any symptoms by a veterinarian and adherence to sanitary practices during translocation.

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- Performing daily health surveys of the herd while they are in the initial "soft-release" enclosed pasture during the first years of the reintroduction.
- Conducting biannual health surveys of the herd following the subsequent full-release.
- Minimizing interaction with neighbouring livestock by preventing bison excursions from the reintroduction zone according to Banff's *Bison Excursion Prevention and Response Plan.*
- In the unlikely event that disease is detected, Parks Canada would activate the necessary disease response procedures to help prevent further risks to bison or any other species. Such a response would depend on the disease identified, but may include additional disease testing, monitoring, quarantine, and if necessary, culling the herd and monitoring other wildlife species in the area for signs of illness.

Q: Will bison impact other wildlife species?

A: Bison are considered "ecosystem engineers" because they influence the landscape around them and have a positive impact on a variety of species ranging from bugs to birds. For instance, their fur provides insulation for bird nests while their grazing patterns create vibrant habitat for other grazers such as elk. As North America's largest land mammal, bison also provide a rich source of nutrients for scavengers, bears and wolves.

Parks Canada has assessed predicted impacts on other species in a detailed environmental impact analysis; on-going monitoring throughout the lifetime of the project would track these impacts and interactions to inform bison management.

Q: Where and when would Canadians be able to see bison in Banff National Park?

A: In the first few years of the project, backcountry users would be most likely to see bison in the remote East Slopes area of Banff National Park. Over time, opportunities for visitors to experience bison in their natural habitat may increase if evaluation determines that the herd can expand into more accessible areas of the park.

Parks Canada also proposes to develop programs and activities to bring the bison story to Canadians and visitors around the world. From being able to see remote camera videos of bison in their natural habitat or to participate in bison-related activities in the Banff townsite, the bison reintroduction project will provide opportunities for Canadians to connect with the return of this iconic animal to Canada's first national park.

Q: What is a Detailed Environmental Impact Analysis?

A: A detailed environmental impact analysis (DEIA) is the most comprehensive form of an environmental impact analysis used by Parks Canada. It provides Parks Canada a means of giving full consideration to the potential effects of its projects on natural and cultural resources prior to implementation, so adverse effects can be avoided, mitigated, or monitored, as required.

The bison reintroduction DEIA considers the predicted influence of bison over the five-year span of the pilot project, and looks at the valued ecosystem components as well the visitor experience and safety, and socio-economic dynamics. This process ensures that Parks Canada has a clear

understanding of the potential project impacts - positive, neutral and negative - and is prepared to address any risks or adverse impacts.

Q: Why is Parks Canada reaching out to Canadians at this point?

A: Parks Canada values and welcomes the perspectives and involvement of others in our programs and projects, as this can play a vital role in improving the project and ensuring its eventual success.

Engaging Canadians in the bison reintroduction project has been a key element since it was first introduced during the 2010 *Banff National Park Management Plan* consultations, where it received overwhelming support. Parks Canada has continued to involve key stakeholders, Indigenous groups and the general public throughout the planning and development of the bison reintroduction proposal.

In early fall 2016, Parks Canada will make the Detailed Environmental Impact Analysis available for public review and comment. Public feedback on any concerns or opportunities that may have been missed or not fully considered by the project team will help inform any needed revisions to the DEIA. For more information, visit: parkscanada.gc.ca/Banff-bison.

Q: What happens next?

A: At the close of the public comment period, Parks Canada will carefully review and analyze all feedback received. This information will be used to finalise the DEIA. A Determination of Impacts for the project will then be made based on the final DEIA. This Determination of Impacts, along with public comments received throughout the project, and any other relevant information, will be considered by the Superintendent in making a final decision about whether and how the project may proceed.

A summary of the public comment will be posted on the Banff National Park website.

Q: Where do I go for more information?

A: For more information, visit: parkscanada.gc.ca/Banff-bison or contact:

Kendra Van Dyk
Banff Field Unit, Parks Canada
403-431-1604
kendra.vandyk@pc.gc.ca.

Parks Canada   Parcs Canada

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Banff
National Park

Q: How do I submit comments? Is there a deadline?

A: Comments may be submitted between October 27, 2016 and November 30, 2016 via:
E-mail: opinion@pc.gc.ca
Mail: Parks Canada,
                 Kendra Van Dyk, Integrated Land Use, Policy and Planning,
                 P.O. Box 900, 101 Mountain Avenue,
                 Banff, Alberta, T1L 1K2

Parks Canada will compile, review and carefully analyse all comments received. Your comments will help Parks Canada identify potential issues or opportunities associated with the project that may have been missed or not fully considered. Feedback will also be used to inform any needed revisions to the Detailed Environmental Impact Analysis.

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| 24 | **Reintroduction of bison into the Rocky Mountain parks of Canada: historical and archaeological evidence** |

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Introduction and Methods

Parks Canada is required by legislative statute to maintain the ecological integrity of Canada's national parks, which includes restoring extirpated species (Parks Canada 2000a-b). To determine if bison *(Bison bison)* were indigenous to the southern Canadian Rockies, we conducted a detailed analysis of first-person historical journals and reviewed existing archaeological data (Kay and White 1995; Kay et al. 1999; Kay, Patton, and White 2000). For, as Aldo Leopold noted over 40 years ago, "if we are serious about restoring [or maintaining] ecosystem health and ecological integrity, then we must know what the land was like to begin with" (Covington and Moore 1994, 45). Five Canadian national parks are found in the Rocky Mountain Cordillera: Banff (Canada's oldest, established in 1885), Yoho (1886), Waterton Lakes (1895), Kootenay (1920), and Jasper (1907). Yoho and Kootenay are located west of the Continental Divide in British Columbia, while Banff, Jasper, and Waterton Lakes are situated east of the divide in Alberta (Figure 24.1).

Some people have used selected quotes from historical journals as evidence that certain animals were or were not abundant during the late 1700s and early 1800s (Byrne 1968; Nelson 1969a; Nelson 1969b; Nelson 1970). With selective quotations, however, there is always a question of whether or not the author included only those passages that support some preconceived hypothesis (Kay 1990; Kay 1995c; Kay and White 1995). To overcome any problems of bias, we systematically recorded all observations of ungulates and other large mammals found in first-person historical accounts of exploration in the southern Canadian Rockies from 1792 to 1872. We then tabulated those data in three ways (Kay et al. 1999; Kay, Patton, and White 2000). First, animals seen; second, game sign encountered or referenced; and third, animals shot or killed. For this analysis, we divided the southern Canadian Rockies into three contiguous geographic regions—the Alberta Foothills, the Rocky Mountains, and the Columbia Valley in British Columbia (Kay et al. 1999; Kay, Patton, and White 2000).

We used only first-person journals penned at the time of the event or edited versions written soon thereafter because later narrative accounts are less accurate (MacLaren 1984; MacLaren 1985; White 1991, 613-632; MacLaren 1994a-c; Shaw and Lee 1997). Even "the humblest narrative is always more than a chronological series of events" (McCullagh 1987, 30). The ideological implications of most narrative historical accounts are "no different from those of the narrative form in fiction" because narratives are always influenced by prevailing cultural myths (Galloway 1991, 454; Pratt 1991; Cronon 1992; Demeritt 1994; Wishart 1997; Kearns 1998). In addition, we used standard techniques developed by historians to gauge the accuracy of all historical journals analyzed during this study (Forman and Russell 1983).

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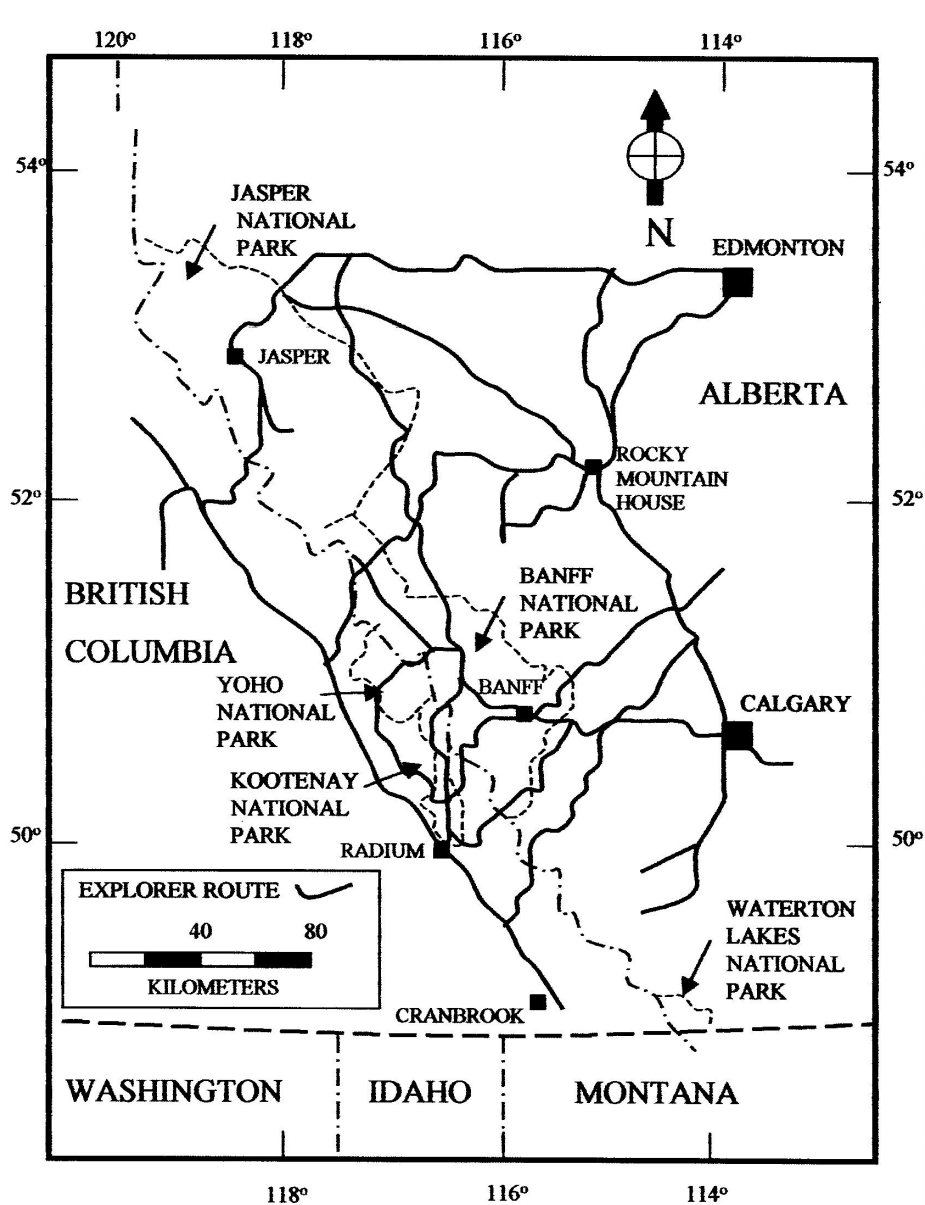
Figure 24.1. Routes of early explorers to the southern Canadian Rockies. Some routes were traveled by more than one expedition. Also shown are Banff, Jasper, Kootenay, Waterton Lakes, and Yoho national parks, as well as present cities and towns.

To determine the relative abundance of ungulate species in pre-Columbian times, we reviewed all available reports for archaeological sites in the southern Canadian Rockies (Kay et al. 1999). This included the Alberta Foothills from the U.S. border

north to the Smoky River, the Rocky Mountains from Montana to Jasper National Park, and the entire Rocky Mountain Trench including the middle Kootenay, upper Columbia, and Canoe River valleys. In all, we consulted more than 200 studies. We also conducted an extensive review of the archaeological literature on site formation processes so that we could make informed interpretations from the archaeological record. Taphonomic and transportation questions were given major consideration. Moreover, we reviewed ethnographic material for peoples who inhabited the Canadian Rockies and adjoining prairies at historical contact.

Results

Early explorers visited most parts of the Canadian Rockies, although their travels were generally confined to major river drainages and established mountain passes (Figure 24.1). David Thompson first crossed the Canadian Rockies in 1807 by way of the North Saskatchewan River, Howse Pass, and the Blaeberry River. The Peigan people, however, objected to Thompson trading with their enemies west of the divide and by 1810, the Peigan had closed the North Saskatchewan to Europeans. This forced David Thompson and the North West Company to find an alternative route farther north using the Athabasca River, Whirlpool River, Athabasca Pass, and Wood River to reach the Columbia. The North Saskatchewan route passed through what is now the northern portion of Banff National Park, while the Athabasca Trail traversed today's Jasper National Park (Kay et al. 1999; Kay, Patton, and White 2000).

Only after the Peigan shifted their trade to American posts on the Missouri River, and then lost their warriors to repeated European-introduced epidemics and other colonial processes, did explorers gain access to the southernmost Canadian Rockies (Smith 1984; Kidd 1986). As a result, the first Europeans known to have traveled Banff's Bow Valley did so only in 1841, and the area comprising Banff, Kootenay, and Yoho national parks was not fully explored until Dr. James Hector of the Palliser Expedition arrived in 1858. By then, the fur trade was declining, and the region's mineral-poor rocks failed to attract the onrush of prospectors that occurred further west in British Columbia.

Historically, ungulates were not common in the southern Canadian Rockies or elsewhere in the Intermountain West (Kay 1990; Kay 1994; Kay 1995a-c; Kay 1997a-c; Kay 1998; White et al. 1998). Nevertheless, bison were the second most frequently observed ungulate species in the Canadian Cordillera (Table 24.1). Bison were also the most commonly encountered ungulate in the Alberta Foothills, but early explorers failed to report seeing bison or those animal's sign in the Rocky Mountain Trench (Table 24.1). Between 1807 and 1810, David Thompson reported killing 22 bison on six separate trips up the North Saskatchewan River, primarily on the Kootenay Plains (Kay et al. 2000). Thompson also reported a bison pound (trap) near Howse Pass, as well as chasing a small herd of bison up and over Howse Pass into British Columbia (Kay et al. 1999). Alexander Henry reported bison on the Kootenay Plains and bison sign further west in today's Banff National Park during a winter expedition in 1811. Similarly, David Thompson reported killing bison in the Athabasca Valley just east of the present Jasper National Park, as well as bison sign further west in the park (Kay et al. 1999). Later explorers to the Canadian Rockies, however, seldom saw or killed any bison, though they did report old bison sign, including bison skulls (Kay et al. 1999).

Archaeological evidence indicates that bison and other ungulates were also rare throughout the mountain cordillera in pre-Columbian times (Kay 1990; Kay 1994; Kay 1998; Kay and White 1995; Kay et al. 1999). In fact, for the last 10,000 years, Intermountain aboriginal diets generally contained only a small amount of ungulate foods, often 10% or less (Kay 1994; Kay 1998). Nonetheless, of the ungulate faunal remains recovered from archaeological sites in the southern Canadian Rockies, bison was the most common species in the Alberta Foothills and on the east slope of the Rocky Mountains (Kay et al. 1999; Langemann 2000b). Bison were the most com-

monly unearthed ungulate in Waterton Lakes National Park, in Crowsnest Pass, and on the lower Bow and Red Deer Rivers. Even in Banff National Park, where human occupation has been dated to 10,300 BP (years before present; Fedje et al. 1995), bison outnumbered other ungulates in archaeological sites. Bison have even been unearthed from archaeological sites in the Rocky Mountain Trench (Langemann 2000b, 7), but it is thought that those bones were deposited by aboriginal people who killed the animals on the east side of the Continental Divide, as there is no evidence that modern bison ever inhabited southern British Columbia (Kay et al. 1999). [Ed. note: an additional table describing these faunal remains could not be included here because of size constraints. See Kay et al. 1999 for details.]

Ecoregion	Elk	Bison	Deer	Bighorn	Moose	Mtn. goat
Alberta Foothills						
Animal sign	1	4	0	0	4	0
Animals seen	19	35	32	4	8	0
Animals killed	19	43	24	5	9	0
Total	39	82	56	9	21	0
Percent	19	40	27	4	10	0
Rank	3	1	2	5	4	6
Rocky Mountains						
Animal sign	11	19	6	12	10	7
Animals seen	12	39	7	69	27	23
Animals killed	9	34	6	113	26	17
Total	32	92	19	194	63	47
Percent	7	21	4	43	14	11
Rank	5	2	6	1	3	4
Rocky Mountain Trench						
Animal sign	5	0	6	0	4	0
Animals seen	7	0	14	2	2	1
Animals killed	7	0	13	3	1	2
Total	19	0	33	5	7	3
Percent	28	0	49	7	10	4
Rank	2	6	1	4	3	5

Alberta Foothills (1792-1863): 29 expeditions, 212 party-days.
Rocky Mountains (1792-1872): 26 expeditions, 369 party-days.
Rocky Mountain Trench (1807-1859): 11 expeditions, 161 party-days.

Table 24.1. Historical evidence relating to the distribution and abundance of ungulates in the southern Canadian Rockies, 1792 to 1872. Animal sign is the number of times animal sign was observed; animals seen is the number of occasions on which various species were seen; animals killed is the number of animals early explorers reported as having killed. Party-days is the total length of time the early exploring parties spent in each ecoregion; expeditions is the number of groups that visited each ecoregion. Species: elk *(Cervus elephus),* bison *(Bison bison),* mule deer *(Odocoileus hemionus)* and white-tailed deer *(O. virginianus)*

combined, bighorn sheep *(Ovis canadensis),* moose *(Alces alces),* and mountain goat *(Oreamnos americanus).* After Kay et al. 1999; Kay, Patton, and White 2000.

Bison bone has not been recovered from archaeological sites in Jasper National Park because few sites have been excavated in that area and bone does not preserve well in those acidic soils (Kay et al. 1999; Langemann 2000b). Surprisingly, few bison bones have been recovered from Kootenay Plains on the North Saskatchewan River, but there all the larger known archaeological sites were flooded when Bighorn Dam was constructed (Kay et al. 1999).

Discussion

Although free-ranging bison have been absent from Canada's Rocky Mountains for more than 100 years (Kopjar 1987), historical sources confirm that bison were present in Banff and Jasper national parks during the early 1800s, while archaeological evidence indicates that bison were present for at least 9,000 years. It has been suggested that these were mountain or wood bison *(Bison bison athabascae),* which maintained populations separated from bison *(B. b. bison)* found on the plains (Meagher 1973; Kopjar 1987). The available data, however, does not support this interpretation. First, there is no morphometric evidence that mountain or wood bison is a valid subspecies (McDonald 1981). Geist (1991) reported that wood bison was an ecotype, not a subspecies, a conclusion supported by genetic analyses (Bork et al. 1991). This suggests that whatever bison were in the mountains during pre-Columbian times or historically were not isolated from bison on the Canadian prairies.

Second, unless constantly replenished with animals from the plains, it is unlikely that bison could have maintained viable populations in the mountains (Kay et al. 1999). Long-term studies in Wood Buffalo National Park indicate that wolf *(Canis lupus)* predation alone can have a dramatic impact on bison numbers, keeping the population well below the level the range could otherwise support (Carbyn, Oosenbrug, and Anions 1993; Carbyn, Lynn, and Timoney 1998; Joly and Messier 2000), while studies of hunter–gatherers indicate that native hunters were the ultimate keystone predator that limited the numbers and distribution of all ungulate species, including bison (Kay 1994; Kay 1997c; Kay 1998). This interpretation complements the view that bison once summered on the Canadian prairies but then moved into the foothills and aspen parklands, and we would add montane valleys, to avoid harsh winters on the open plains (Moodie and Ray 1976; Morgan 1980; Hanson 1984; Chisholm et al. 1986; Bamforth 1987; Epp 1988). Some bison may have summered in the mountains, but non-migratory animals would have been under intense predation by Native Americans, wolves, and bears *(Ursus arctos* and *U. americanus).*

Near the head of the Red Deer River in Banff National Park, for instance, there are house pits at the foot of Drummond Glacier that continue to puzzle archeologists (Magne 1994; Langemann 1995; Langemann 2000b). This is a 3,000-year-old stratified site "where the only faunal remains to date are from bison" (Langemann 2000b, 7). Pit houses were very labor-intensive structures to build and are usually associated with Interior Plateau cultures and winter village sites at low elevations in the central Columbia Basin, not the Rocky Mountains (Langemann 1987; Magne 1994; Langemann 1995). We propose that these pit houses were part of a sophisticated management system employed by native people to herd bison into the mountains. This system included extensive aboriginal burning (White 1985; Kay 1995a-b; Heathcott 1999; Kay 2000) to both attract bison and make it easier for people to drive bison to killing sites deep in the mountains (White et al. 2001). This would have lowered those people's transportation costs, as it would have required less energy to transport dried meat and other bison products from kill sites near the Centennial Divide than from areas 50-100 km to the east. In addition, this strategy would

have minimized risk associated with people from the interior of British Columbia hunting bison on the Canadian prairies that were claimed by plains tribes, as these two distinct cultural groups were often engaged in open warfare and other hostilities (Smith 1984; Kidd 1996).

To test this hypothesis, Parks Canada subjected archaeologically recovered bison bone to stable carbon analysis (Langemann 2000a-b). Cool-season, or C3, plants fix ^{12}C and ^{13}C isotopes in different proportions than warm-season, or C4, grasses, which, in turn, are incorporated into the bones of herbivores who consume those plants. Thus, by performing isotopic analyses, it is possible to determine the proportion of C3 and C4 plants consumed by bison that once frequented western ranges (Chisholm et al. 1986; Tieszen 1994; Gannes et al. 1997). Moreover, because C4 plants are exceedingly rare in the Alberta Foothills and mountains, if bison unearthed from sites in the Canadian Rockies had a high proportion of C4 plants in their diets, then those animals would necessarily have spent a considerable portion of their lives several hundred kms to the east and south on the Great Plains (Chisholm et al. 1986; Langemann 2000a-b).

Of the bison bones analyzed to date, samples from Waterton Lakes and Banff national parks indicate that those animals consumed a significant proportion of C4 plants. Bison from Waterton Lakes had up to 28% C4 plants in their diet (Langemann 2000a), which is similar to bison tested further east on the Canadian prairies (Chisholm et al. 1986, 201). Even bison from deep inside Banff National Park once consumed major quantities of C4 plants—up to 14% of their diets, which again is significant since there are virtually no C4 plants in the park. Thus, these data support the hypothesis that bison found in the Rocky Mountains commonly migrated to and from the xeric grasslands on the northern Great Plains, a distance of several hundred kms. These data also support the hypothesis that "mountain bison" is not a valid subspecies or ecological concept, and that bison from the plains were a source population for bison that were under intense human and carnivore predation in the more confined mountain and foothill valleys (Kay et al. 1999).

Conclusions

Historical and archaeological data indicate that plains bison once frequented the Alberta Foothills and Canadian Rockies. Archaeological and other evidence suggest that those bison were intensively hunted by native people and that these ecosystems were structured from the top-down by carnivore and human predation—a factor that must be taken into consideration if free-ranging plains bison are to be reintroduced to Banff and other Canadian national parks (see the next chapter in this volume by White et al.). Furthermore, we suggest that, as a condition of reintroduction, hunting by First Nations may be required to maintain appropriate herd sizes and ecological integrity. This conclusion is in keeping with the recommendations of Parks Canada's recent Ecological Integrity Panel (Parks Canada 2000a-b).

According to that panel, "humans have been present for thousands of years on the lands that now constitute Canada. Their association with the land and their traditional activities were part of the ecosystems and, to a certain extent, made the landscape what it was when Europeans first arrived.... [Moreover] the influence of Aboriginal peoples is fully consistent with ... [the] definition of ecological integrity. [In fact] ... this traditional human role is an important element of the ecological integrity of the ecosystems that Parks Canada is mandated to preserve or restore..." (Parks Canada 2000b, 7-2).

References

Bamforth, D.B. 1987. Historical documents and bison ecology on the Great Plains. *Plains Anthropology* 32:115, 1-16.

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Bork, A.M., C. Strobeck, F.C. Yeh, R.J. Hudson, and R.K. Salmon. 1991. Genetic relationship of wood and plains bison based on restriction fragment length polymorphisms. *Canadian Journal of Zoology* 69, 43-48.

Byrne, A.R. 1968. *Man and Landscape Change in the Banff National Park Area Before 1911.* Studies in Land Use History and Landscape Changes, National Park Series, no. 1. Calgary, Alta.: University of Calgary.

Carbyn, L.N., N.J. Lynn, and K. Timoney. 1998. Trends in the distribution and abundance of bison in Wood Buffalo National Park. *Wildlife Society Bulletin* 26, 463-470.

Carbyn, L.N., S.M. Oosenbrug, and D.W. Anions. 1993. *Wolves, Bison, and the Dynamics Related to the Peace–Athabasca Delta in Canada's Wood Buffalo National Park.* Circumpolar Research Series 4. Edmonton, Alta.: University of Alberta.

Chisholm, B., J. Driver, S. Dube, and H.P. Schwarcz. 1986. Assessment of prehistoric bison foraging and movement patterns via stable-carbon isotopic analysis. *Plains Anthropologist* 31:116, 1993-205.

Covington, W.W., and M.M. Moore. 1994. Southwestern ponderosa forest structure: change since Euro-American settlement. *Journal of Forestry* 92, 39-47.

Cronon, W. 1992. Nature, history, and narrative. *Journal of American History* 78, 1347-1376.

Demeritt, D. 1994. Ecology, objectivity and critique in writings on nature and human societies. *Journal of Historical Geography* 20, 22-37.

Epp, H.T. 1988. Way of the migrant herds: dual dispersion strategy among bison. *Plains Anthropologist* 33:121, 309-320.

Fedje, D.W., J.M. White, M.C. Wilson, D.E. Nelson, J.S. Vogel, and J.R. Southon. 1995. Vermilion Lakes Site: adaptations and environments in the Canadian Rockies during the latest Pleistocene and early Holocene. *American Antiquity* 60, 81-108.

Forman, R.T., and E.W. Russell. 1983. Evaluation of historical data. *Ecological Society Bulletin* 64, 5-7.

Galloway, P. 1991. The archaeology of ethnohistorical narrative. Pp. 453-469 in *Columbian Consequences—Volume 3.* D.H. Thomas, ed. Washington, D.C.: Smithsonian Institution Press.

Gannes, L.Z., D.M. O'Brien, and C. Martinez del Rio. 1997. Stable isotopes in animal ecology: assumptions, caveats, and a call for more laboratory experiments. *Ecology* 78, 1271-1276.

Geist, V. 1991. Phantom subspecies: the wood bison *Bison bison Athabascae* Rhoads 1897 is not a valid taxon, but an ecotype. *Arctic* 44, 283-300.

Hanson, J.R. 1984. Bison ecology in the northern plains and a reconstruction of bison patterns for the North Dakota region. *Plains Anthropologist* 29:104, 83-113.

Heathcott, M. 1999. Lightning and lightning fire, central Cordillera, Canada. *Research Links* 7:3, 1, 5, 14.

Joly, D.O., and F. Messier. 2000. A numerical response of wolves to bison abundance in Wood Buffalo National Park, Canada. *Canadian Journal of Zoology* 78, 1101-1104.

Kay, C.E. 1990. Yellowstone's northern elk herd: a critical evaluation of the "natural regulation" paradigm. Ph.D. dissertation, Utah State University, Logan.

———. 1994. Aboriginal overkill: The role of Native Americans in structuring western ecosystems. *Human Nature* 5, 359-398.

———. 1995a. Aboriginal overkill and native burning: implications for modern ecosystem management. *Western Journal of Applied Forestry* 10, 121-126.

———. 1995b. Pre-Columbian human ecology: aboriginal hunting and burning have serious implications for park management. *Research Links* 3:2, 20-21.

———. 1995c. An alternative interpretation of the historical evidence relating to the abundance of wolves in the Yellowstone Ecosystem. Pages 77-84 in *Ecology and*

Conservation of Wolves in a Changing World. L.D. Carbyn, S.H. Fritts, and D.R. Seip, eds. Edmonton, Alta.: Canadian Circumpolar Institute.

———. 1997a. Is aspen doomed? ***Journal of Forestry*** 95:5, 4-11.

———. 1997b. Viewpoint: ungulate herbivory, willows, and political ecology in Yellowstone. ***Journal of Range Management*** 50, 139-145.

———. 1997c. Aboriginal overkill and the biogeography of moose in western North America. ***Alces*** 33, 141-164.

———. 1998. Are ecosystems structured from the top-down or bottom-up? A new look at an old debate. ***Wildlife Society Bulletin*** 26, 484-498.

———. 2000. Native burning in western North America: implications for hardwood management. Pp. 19-27 in Proceedings: Workshop on Fire, People, and the Central Hardwood Landscape. D.A. Yaussy, ed. U.S. Forest Service General Technical Report NE-274. N.p.

Kay, C.E., B. Patton, and C.A. White. 2000. Historical wildlife observations in the Canadian Rockies: Implications for ecological integrity. ***Canadian Field-Naturalist*** 114:4, (in press).

Kay, C.E., and C.A. White. 1995. Long-term ecosystem states and processes in the Central Canadian Rockies: a new perspective on ecological integrity and ecosystem management. Pp. 119-132 in ***Sustainable Society and Protected Areas: Contributed Papers of the 8th Conference on Research and Resource Management in Parks and on Public Lands.*** R.M. Linn, ed. Hancock, Mich.: The George Wright Society.

Kay, C.E., C.A. White, I.R. Pengelly, and B. Patton. 1999. ***Long-Term Ecosystem States and Processes in Banff National Park and the Central Canadian Rockies.*** Parks Canada Occasional Paper no. 9. Ottawa: Environment Canada.

Kearns, G. 1998. The virtuous circle of facts and values in the new western history. ***Annals of the Association of American Geographers*** 88, 377-409.

Kidd, K.E. 1986. ***Blackfoot Ethnography.*** Archaeological Survey of Alberta Manuscript Series no. 8. Edmonton, Alta.: Provincial Museum of Alberta.

Kopjar, N.R. 1987. A study to analyze alternatives for wood bison management in Banff National Park. Unpublished report on file, Banff Warden Office, April 22. Banff, Alta.: Banff National Park.

Langemann, E.G. 1987. Zooarchaeology of the Lillooet region, British Columbia. M.A. thesis, Simon Fraser University, Burnaby, B.C.

Langemann, E.G. 1995. Cultural depressions: aboriginal housepits in Banff National Park continue to puzzle archaeologists. ***Research Links*** 3:3, 4-5.

Langemann, G. 2000a. Stable carbon isotopic analysis of archaeological bison bone. ***Research Links*** 8:1, 4, 12.

———. 2000b. Archaeological evidence of bison in the central Canadian Rockies. Pp. 6-12 in ***Proceedings of the Rocky Mountain Bison Research Forum—October 28, 1999, Rocky Mountain House, Alberta.*** T. Shury, ed. Banff, Alta.: Parks Canada, Banff National Park.

MacLaren, I.S. 1984. David Thompson's imaginative mapping of the Canadian Northwest, 1784-1812. ***ARIEL: A Review of International English Literature*** 15, 89-106.

———. 1985. Aesthetic mappings of the West by the Palliser and Hind survey expeditions, 1857-1859. ***Studies in Canadian Literature*** 10, 24-52.

———. 1994a. The HBC's Arctic expedition, 1836-1839: Dease's field notes as compared to Simpson's narrative. Pp. 465-479 in ***The Fur Trade Revisited.*** J.S.H. Brown, W.J. Eccles, and D.P. Heldman, eds. East Lansing: Michigan State University Press.

———. 1994b. From exploration to publication: the evolution of a nineteenth-century Arctic narrative. ***Arctic*** 47, 43-53.

———. 1994c. Explorers' and travellers' narratives: a peregrination through different editions. ***Facsimile*** 12, 8-16.

McCullagh, C.B. 1987. The truth of historical narratives. *History and Theory (Beiheft)* 26, 30-45.

McDonald, J.N. 1981. North American bison: their classification and evolution. Berkeley: University of California Press.

Magne, M. 1994. Perplexing housepits in Banff: who made them and why? Research Links 2:3, 12-13.

Meagher, M.M. 1973. The Bison of Yellowstone National Park. National Park Service Science Monograph Series no. 1. Washington, D.C.: National Park Service.

Moodie, D.W., and A.J. Ray. 1976. Buffalo migrations in the Canadian plains. *Plains Anthropologist* 21:71, 45-52.

Morgan, R.G. 1980. Bison movement patterns on the Canadian plains: An ecological analysis. *Plains Anthropologist* 25:88 (part 1), 143-160.

Nelson, J.G. 1969a. Some observations on animals, landscape, and man, in the Bow Valley area: c. 1750-1885. Pp. 219-237 in *Vegetation, Soils, and Wildlife.* J.G. Nelson and M.J. Chambers, eds. Toronto: Methuen.

———. 1969b. Land use history, landscape change and planning problems in Banff National Park. *IUCN Bulletin* 2:10, 80-82.

———. 1970. Man and landscape change in Banff National Park: a national park problem in perspective. Pp. 63-96 in *The Canadian Parks in Perspective.* J.G. Nelson, ed. Montreal: Harvest House.

Parks Canada. 2000a. "*Unimpaired for Future Generations?" Protecting Ecological Integrity with Canada's National Parks. Volume I: A Call to Action.* Report of the Panel on the Ecological Integrity of Canada's National Parks. Ottawa: Canadian Minister of Public Works and Government Services.

———. 2000b. "*Unimpaired for Future Generations?" Protecting Ecological Integrity with Canada's National Parks. Volume II: Setting a New Direction for Canada's National Parks.* Report of the Panel on the Ecological Integrity of Canada's National Parks. Ottawa: Canadian Minister of Public Works and Government Services.

Pratt, M.L. 1991. *Imperial Eyes: Travel Writing and Transculturation.* New York: Routledge.

Shaw, J.H., and M. Lee. 1997. Relative abundance of bison, elk, and pronghorn on the southern plains. *Plains Anthropologist* 42:159, 163-172.

Smith, A.H. 1984. *Kutenai Indian Subsistence and Settlement Patterns, Northwest Montana.* Technical Report. Seattle, Wash.: U.S. Army Corps of Engineers.

Tieszen, L.L. 1994. Stable isotopes on the plains: vegetation analyses and diet determinations. Pp. 261-282 in *Skeletal Biology in the Great Plains: Migration, Warfare, Health, and Subsistence.* D.W. Owsley and R.L. Jantz, eds. Washington, D.C.: Smithsonian Institution Press.

White, C.A. 1985. *Wildland Fire in Banff National Park, 1880-1980.* Parks Canada Occasional Paper no. 3. Ottawa: Environment Canada.

White, C.A., C.E. Olmsted, and C.E. Kay. 1998. Aspen, elk, and fire in the Rocky Mountain national parks of North America. *Wildlife Society Bulletin* 26, 449-462.

White C.A., M.C. Feller, I. Pengelly, and P. Vera. In press. New approaches for testing fire history hypotheses in the Canadian Rockies. *Proceedings of the Fourth International Conference on Science and Management of Protected Areas.* Wolfville, N.S.: Science and Management of Protected Areas Association.

White, R. 1991. *It's Your Misfortune and None of My Own: A History of the American West.* Norman: University of Oklahoma Press.

Wishart, D. 1997. The selectivity of historical presentation. *Journal of Historical Geography* 23, 111-118.

AGENDA ITEM

PROJECT: Delegation – Rocky Mountain House Search and Rescue		
PRESENTATION DATE: November 22, 2016		
DEPARTMENT: Community and Protective Services	**WRITTEN BY:** Ted Hickey	**REVIEWED BY:** Ron Leaf
BUDGET IMPLICATION: ☐ N/A ☐ Funded by Dept. ☒ Reallocation		
LEGISLATIVE DIRECTION: ☒None ☐ Provincial Legislation (cite) ☐ County Bylaw or Policy (cite)		
STRATEGIC PLAN THEME: Well Governed and Leading Organization	**PRIORITY AREA:** 2.1	**STRATEGIES:** 2.1.1 2.1.2 2.1.3
ATTACHMENT(S): That Council receives the presentation as information for consideration during the 2017 Operational and Capital budgets process.		
RECOMMENDATION: Memorandum of Understanding Agreement Between Clearwater County and Search and Rescue Rocky Mountain House		

BACKGROUND:

In 2016 Clearwater County and the Rocky Mountain House Search & Rescue (SAR–RMH) entered into a 2 year Memorandum of Understanding (MOU). The 2016 approved operational budget reflects initiating support for operational costs. This support is again reflected in the 2017 operating budget to be presented.

Council did not approve Capital support cost proposed in 2016 however; given the ongoing fundraising challenges faced by SAR-RMH these are being proposed within the 2017 Capital budget for Council's consideration. This area of funding is seen as necessary to ensure SAR's ongoing capabilities, reliability and safety of responding personnel in the delivery of specialized rescue services.

SAR's continues to be a registered society.

Mr. Don Livingston and Mr., Ed Van Heeren from Rocky Mountain House Search & Rescue (SAR–RMH) will be presenting information to Council.

Memorandum of Understanding

BETWEEN:

Clearwater County

Box 550
4340-47 Avenue
Rocky Mountain House, Alberta
T4T 1A4
(Hereinafter referred to as 'County')

-and-

Rocky Mountain House Volunteer Search and Rescue Society

Box 1888
Rocky Mountain House, Alberta
T4T 1B4
(Hereinafter referred to as 'SAR')

WHEREAS SAR is one of the search and rescue teams in Alberta providing aid to tasking agencies in locating and rescuing lost, missing or injured persons, assisting in policing resource requirements such as evidence searches and assisting in resource requirements in areas of municipal emergency management and mitigation efforts;

AND WHEREAS the County recognizes the valuable contribution made to the health and community well-being to all Albertans by search and rescue teams operating in Alberta and the County is in agreement that the SAR is a valued response organization within the County;

AND WHEREAS the Parties have a mutual goal of a sustained approach in meeting community and various agency needs through the access of search and rescue capabilities in Alberta;

AND WHEREAS the County recognizes the desire of SAR to maintain its independent status as a non-profit society and as such donations and other funding acquired by SAR will be utilized towards SAR's operations, which may include both operating and capital funding;

AND WHEREAS the County recognizes the economic challenges faced by SAR in providing continued services to the community.

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In respecting the above statements:

1. SAR will maintain an independent Non Profit Society status within the Province of Alberta and as per applicable legislation, regulation and conditions unless mutually agreed upon by both Parties. SAR will provide an annual statement from Services Alberta indicating SAR's "good standing" status.

2. Both Parties will agree to SAR being considered "a department like entity" for budgetary and business related activities within the County's Division of Community and Protective Services. SAR will submit to the County for annual consideration, a business plan associated to an Operating and Capital budget for consideration.

3. SAR will report quarterly or as requested to the Director of Community and Protective Services regarding areas or activities of service provision, annual budgetary or other supporting resources financial status, or general business related activities to meet SAR related business needs and meet County requirements.

4. The County will annually review to confirm its ability to provide an annual contribution of funds and/or resources to assist SAR's operations in the same business/budgetary process as other departments within the County, which may include both operating and capital funding as approved annually by The Clearwater County Council.

5. SAR is in agreement that SAR and its members shall follow any and all applicable Clearwater County policies and procedures as so long as these policies and procedures are not in direct conflict with SAR maintaining an independent Non Profit Society status within the Province of Alberta or conflict with maintaining its active support of policing operations or meeting policing requested resource commitment.

6. Both Parties shall work towards: a review of, confirmation of the mutual benefits of, ensure legal compliance of, and obtain each party's agreement to the transfers of capital assets from one party to the other party. This shall be completed within a two year period of the signing of this agreement.

7. The County shall continue to provide insurance coverage to SAR during the term of the agreement.

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8. This MOU may be terminated by either participant upon ninety (90) days written notice. Termination does not release a participant from any present or pending financial, legal, or contractual obligations which accrued while the MOU was in force. Any and all assets held by each party at the time of termination shall remain those of the party having ownership of such assets at the time of termination.

IN WITNESS WHEREOF the Parties have executed this Memorandum of Understanding, this ___*14*___ day of ___*December*___, 2015.

CLEARWATER COUNTY

_____
Ron Leaf, CAO

_____
Patrick Alexander, Reeve

ROCKY SEARCH AND RESCUE

_____

_____

_____
Edward Van Heeren
(Print Name)

_____
DOUGLAS RITCHIE
(Print Name)

President for and on behalf of
Rocky Search and Rescue

Vice President for and on behalf
of Rocky Search and Rescue

AGENDA ITEM

PROJECT: Prairie Creek Memorial Cemetery Association Delegation		
PRESENTATION DATE: November 22, 2016		
DEPARTMENT: Community & Protective Services	**WRITTEN BY: Jerry Pratt**	**REVIEWED BY:** Ted Hickey/Rodney Boyko
BUDGET IMPLICATION: ☐ N/A ☐ Funded by Dept. ☐ Reallocation		
LEGISLATIVE DIRECTION: ☐None ☒ Provincial Legislation (cite) ☐ County Bylaw or Policy (cite) **Province of Alberta Cemeteries Act**		
STRATEGIC PLAN THEME: 3. Community Well Being	**PRIORITY AREA:**	**STRATEGIES:**
ATTACHMENT(S): 1. Letter for Agenda Topics **2. Prairie Creek Cemetery Purpose**		
RECOMMENDATION: That Council directs Administration to complete in 2017: - initiate stakeholder meetings with groups maintaining and operating cemeteries to gather information regarding a needs assessment, identify common challenges, develop a common guideline as a reference if needed and report options to Council and stakeholders of recommended long term sustainable approaches, - continue the evaluation of all registered cemeteries to complete the geospatial data layer and current state of cemeteries for use in planning and other uses as well as formal communication process for reporting internments, - identify and if needed develop an appropriate cemeteries support strategy, bylaw, policy and forecasted future budget for Council's consideration, - include the Prairie Creek Memorial Cemetery Association's request as a part of future County initiated processes that will involve all cemetery stakeholders.		

BACKGROUND:

Clearwater County currently has 15 registered cemeteries within its municipal borders. Currently, Clearwater County has land title for 5 cemeteries and others listed in land titles. Community groups provide operational oversight and most of the mowing and maintenance with some support from the County's AG Services Department. The County does not have Bylaws, Policies, or a long term budget strategy regarding

cemeteries. All operations of cemeteries fall under the Cemeteries Act and associated Regulations.

A delegation from the Prairie Creek Memorial Cemetery Association met with staff to discuss their current practices and identify their current and future gaps in their maintenance and oversight of the Prairie Creek Memorial Cemetery. As a result of this meeting, the Prairie Creek Memorial Association expressed a desire to have a delegation address Council.

Discussed at the meeting included:

1. Review and possible adoption of the Prairie Creek Memorial Cemetery purpose and guidelines for all cemeteries use in the County.
2. Consideration for the County to purchase the acreage adjacent to the Prairie Creek Memorial Cemetery should it become available for sale. This would allow future expansion for burial sites.
3. Request of budget expenditure to replace the fencing and gates at the cemetery, in the summer of 2017.
4. Request of budget expenditure to for surveying as there is a need to expand the number of plots within the existing cemetery.

Administrations responses to the group's requests are as follows:

Item 1: Some of the proposed guidelines may be applicable for use by other groups operating cemeteries within the County. Discussion with other Cemetery Associations should be undertaken, and this may lead to the need for a proposed common guidelines and a Bylaw concerning providing assistance to cemeteries supporting groups for operations and maintenance.

Item 2: Purchasing land to assist with expansion should be a part of a larger strategy concerning cemeteries. A policy regarding cemetery expansion may need to be developed after discussion with the Public, Cemetery Associations, and administration as funding for land purchase may apply to other cemeteries as well.

Items 3 & 4: Historically there are no specific policy and limited budget for supporting cemeteries where the land title is not the County's. The request for funds to purchase the fence and gate (estimated between $7,500 - $10,000) are not funded in the Cemeteries 2016 budget but may fall under the Donations and Solicitations Policy. The Prairie Creek Memorial Cemetery Association's request for funding could be approved by Council however; Administration is not aware of any precedent. The need for maintenance funding and surveying may apply to other cemeteries as well.

Prairie Creek Memorial Cemetery Association

November 10, 2016

Attention: Jerry Pratt/Ted Hickey

Thank you for meeting with us on November 4 regarding the cemetery.

As discussed, we would like to attend the November 22/16 council meeting to address the following items:
1. Review and possible adoption of the Prairie Creek Memorial Cemetery purpose and guidelines for all cemeteries in the County.
2. Consideration to purchase the acreage adjacent to the cemetery should it become available for sale. This would allow future expansion for burial sites.
3. Budget consideration to replace the fencing and gates at the cemetery, in the summer of 2017.
4. The unsurveyed portion of the cemetery grounds need to be surveyed as we are running out of surveyed plots.

Tanya Johnston   Alana Arns   David McDonald
President   Caretaker   Past President
403-844-4020   403-845-6679   403-845-6393

HISTORY

The Prairie Creek cemetery was established in the early 1900's when the local community purchased land from one of its residents for the purpose of providing a local place of internment. Although legal responsibility and jurisdiction have changed over the years due to provincial statute, actual maintenance and operation has continuously been conducted by the community since the cemetery's inception.

PURPOSE

The purpose of the Prairie Creek cemetery is to provide a final place of internment for the remains of the residents of the former Glacier and Pleasantvale school districts and those areas to the west which were served by those districts, and their immediate families, should they so desire. The Prairie Creek Cemetery Association is a volunteer organization formed for the purpose of overseeing the operations and management of the Prairie Creek cemetery.

GOALS

1. To manage and restrict the use of the cemetery so as to sustain and achieve a long-term availability of burial plots.
2. To keep the cemetery maintained in a neat and clean condition
3. To fully utilize the existing land-base and to regulate development of the unsurveyed portion of the cemetery in an orderly manner.
4. To maintain and preserve the cenotaph.

The association will from time to time, set such regulations, rules and restrictions, set such fees and expend such monies as it deems

necessary to achieve these goals and to efficiently operate the cemetery.

The association may appoint a manager to co-ordinate ongoing operations. The manager will collect all fees, maintain a record of each plot sold, see that all funds collected on behalf of the cemetery are kept on deposit in a bank or credit union in Rocky Mountain House in the name of the association, see that a record is kept of all financial transactions, and ensure that all records are kept and all operations of the cemetery are done in accordance with the Cemetery's Act. A copy of the survey of the cemetery showing all plots sold, used, and vacant shall be kept at the County of Clearwater offices. This map shall be regularly updated as requested by Clearwater County.

AGENDA ITEM

PROJECT: Central Alberta Economic Partnership (CAEP) Business Representative Appointment		
PRESENTATION DATE: November 22, 2016		
DEPARTMENT: Community & Protective Services	WRITTEN BY: Tracy Haight	REVIEWED BY: Ted Hickey/Ron Leaf
BUDGET IMPLICATION: ☒ N/A ☐ Funded by Dept. ☐ Reallocation		
LEGISLATIVE DIRECTION: ☒None ☐ Provincial Legislation (cite) ☐ County Bylaw or Policy (cite)		
STRATEGIC PLAN THEME: Well Governed and Leading Organization	PRIORITY AREA: Development of a regional economic development plan	STRATEGIES: 2.7.3
RECOMMENDATION: That Council appoints Jerry Pratt, Clearwater County Community Relations Advisor, as the CAEP Business Representative, effective November 1, 2016.		

BACKGROUND:

The Central Alberta Economic Partnership Ltd. is a regional alliance of municipalities, First Nations, business agencies and organizations that support economic development in the Central Alberta Region.

At the October 25 Organizational Meeting, Council appointed a County resident as a member at large, for a one-year term, to serve as the County's representative on CAEP's committee. As of November 8, the County resident indicated to staff he is no longer available for this position.

For the Clearwater County member at large vacancy, Staff requests direction from Council on whether Council wishes to:
1. fill the vacancy by advertising for new applicants or,
2. fill the vacancy by a Council's selection of a community member without advertising for new applicants or,
3. leave the position vacant or,
4. fill the vacancy by appointing the Clearwater County's Community Relations Advisor (CRA).

(…**CAEP Business Representative**… "*an individual chosen by the member municipality and may be an **Economic Development Officer**, Economic Development Board Member, CAO, Chamber Executive, or business owner or designate.*").

The role, functions and administrative duties of the CRA supports Council's strategy for developing an economic development plan that promotes industry, business, agri-business and tourism in Clearwater County. Having the CRA as a business representative on CAEP committees may add support to accomplishing this strategy.

AGENDA ITEM

PROJECT: Taimi Hall Demolition and Land Update		
PRESENTATION DATE: November 22, 2016		
DEPARTMENT: Community and Protective Services	**WRITTEN BY:** Jerry Pratt	**REVIEWED BY:** Ted Hickey/Ron Leaf
BUDGET IMPLICATION: ☐ N/A ☐ Funded by Dept. ☒ Reallocation		
LEGISLATIVE DIRECTION: ☐None ☐ Provincial Legislation (cite) ☒ County Bylaw or Policy (cite) Policy: Grant Funding for Community Halls, Associations & Non-profit Groups		
STRATEGIC PLAN THEME: 3. Community Well Being	**PRIORITY AREA:**	**STRATEGIES:** 3.1.2
ATTACHMENT(S): Photos and Invoice re cost breakdown		
RECOMMENDATION: Council approval of transfer of $33,405 from the Economic Development budget.		

BACKGROUND:

The Taimi Hall building was demolished on October 4 with soil and seed put in place on October 5, 2016. Council had approved a $40,000 expenditure based upon estimates obtained to be included within the Community Services 2016 Budget.

As a result of Asbestos inspection, removal and dumping cost exceeded the original estimates resulting in an overage of $33,405. A breakdown of costs are included as an attachment.

The overage can be addressed by transferring $33,405 from the Economic Development budget to the Community Services budget. This transfer requires Council approval

As additional information, feedback from the Leaseholder has been positive. Administration is currently working with legal counsel seeking title transfer of the 1.98 acres owned by the former Taimi Hall Community Club.

Recommendation:

The Administration recommends Council approval of a transfer of $33,405 from the Economic Development 2016 Budget to Community Services 2016 Budget.

Pidherney's

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1964 - 2014

Pidherney's Inc.
P.O. Box 940
Rocky Mountain House, AB T4T 1A7

Phone: 403.845.3072
Fax: 403.845.5370

Invoice

Invoice Number	109125
Invoice Date	Oct 06/16
PO Number	CPS 2016-010

EFT #3364

CLECOU	CLEARWATER COUNTY P.O. BOX 550 ROCKY MTN. HOUSE, AB T4T 1A4

Phone	(403) 845-4444
Fax	(403) 845-7330
Attention	ATTN: ACCOUNTS PAYABLE

Description	Ticket #	Quantity	Unit Price	Unit	Tax	Amount
TEAR DOWN AND DISPOSAL AS PER RFP		1.00	20,000.00	EA	GA	20,000.00
SUPPLY AND DELIVER BACKFILL AS PER RFP		1.00	6,400.00	EA	GA	6,400.00
SUPPLY AND DELIVER TOPSOIL		1.00	7,200.00	EA	GA	7,200.00
SUPPLY AND PLACE SEED AND HARROW		1.00	1,000.00	EA	GA	1,000.00
EXTRA- PRE DOM0 SURVEY	74885	1.00	2,335.00	EA	GA	2,335.00
EXTRA- ASBESTOS REMOVAL & ABATEMENT		1.00	17,522.65	EA	GA	17,522.65
EXTRA- ROCKY REGIONAL FEES	VARIOUS	1.00	12,242.33	EA	GA	12,242.33
10% THIRD PARTY HANDLING FEE		0.10	32,099.98	EA	GA	3,210.00

TAIMI HALL COMMUNITY HALL DEMOLITION

ENTERED

GST Registration Number   103785325

Subtotal:	69,909.98
Holdback:	0.00
GST (5%)	3,495.50
	0.00
Total:	73,405.48

Terms: Net 30 Days - 2% Service Charge

Please Pay By Invoice - NO Statement Will Be Issued

AGENDA ITEM

PROJECT: *TABLED ITEM* Broadband Request for Proposal – Focused Study Area	

PRESENTATION DATE: November 22, 2016

DEPARTMENT: Community Services / CPS Division	**WRITTEN BY:** Ted Hickey	**REVIEWED BY:** R. Leaf, CAO

BUDGET IMPLICATION: ☐ N/A ☒ Funded by Dept. ☐ Reallocation

LEGISLATIVE DIRECTION: ☒None ☐ Provincial Legislation (cite) ☐ County Bylaw or Policy (cite)

STRATEGIC PLAN THEME: 1: Managing our Growth 2: Well Governed and Leading Organization 3: Community Well-Being	**PRIORITY AREA:** 1.1, 1.3, 2.1, 2.2, 3.3	**STRATEGIES:** 1.2.1, 1.1.3, 1.3.4, 2.1.1, 2.2.1, 2.2.3, 3.3.1

ATTACHMENTS:

Broadband Feasibility Study Proposal – Taylor Warwick December 14, 2015

Regional Broadband Investigation Needs, Opportunities ,and Approaches At the Local Level and for the Calgary Region Landscape Issues - Taylor Warwick August 14, 2016

Council Agenda Item Internet Broadband Consultant Request for Quotation for Conceptual Design – Focused Study Area November 8, 2016

RECOMMENDATION: That Council discuss the tabled agenda item Internet Broadband Consultant Request for Quotation for Conceptual Design – Focused Study Area from November 8, 2016 Council Meeting and provide direction to the Administration regarding whether to proceed.

BACKGROUND:

As per Council's direction on November 8, 2016, attached are the Broadband Feasibility Study Proposal – Taylor Warwick December 14, 2015 and Regional Broadband Investigation Needs, Opportunities ,and Approaches At the Local Level and for the Calgary Region Landscape Issues.

taylorwarwick
CONSULTING LIMITED

Proposal

A Broadband Feasibility Study

Clearwater County

Submitted to Clearwater County
by Taylor Warwick Consulting Limited

December 14, 2015

December 14, 2015

Mr. John Vandermeer
Division 4 Councillor & Chair, Broadband Committee
Clearwater County
jvandermeer@clearwatercounty.ca
+1 (403) 845-4444

Dear John,

RE: A Broadband Feasibility Study – Clearwater County

In response to your request of December 8th, Taylor Warwick Consulting is pleased to submit this proposal to complete, for Clearwater County, a Broadband Feasibility study focused on the delivery of broadband services to homes and business throughout the county. Such capabilities could significantly enhance economic development throughout the region and its environs.

Specifically, based on high level designs, the feasibility study will provide Clearwater county with a preliminary view of the business case associated with the deployment of broadband infrastructure and services throughout County. The business case will be completed in two phases. Phase 1 will provide a view based on deployment to a sampling of growth hamlets, a rural stretch of highway, the town of Caroline, and parts of Rocky Mountain House. Phase 2 will look at extending the view to encompass the majority of the county. The study will include strategic considerations, capital, operational, and revenue estimates, five and ten year ROI and NPV estimates, potential financing options, and next steps should Clearwater find the elect to move forward.

In support of this work, TaylorWarwick has a world-class set of financial modeling, fibre design, and propagation coverage tools. These tools enable assessment of optimized hybrid fibre-wireless strategies, and solutions that can be tailored to any specific and unique area within Western Canada. Together, TaylorWarwick and the Olds Institute for Community & Regional Development successfully established the first and to date, only, sustainable community-based fibre-to-the home network in Canada: O-NET now offers every resident and business in Olds, Alberta, Gb/s services and a complete triple-play services portfolio.

We would truly welcome the opportunity to work with the Broadband Committee and Clearwater County to complete this proposed feasibility study and to help facilitate synergy with the Broadband activities in other regions of the province.

Yours sincerely,

Craig Dobson
President
cdobson@taylorwarwick.ca

taylorwarwick
CONSULTING LIMITED

Broadband Feasibility Study – Clearwater County

Contents

Summary

This proposal is to complete, for the Clearwater county, a Broadband Feasibility study focused on the delivery of broadband services to homes and businesses throughout Clearwater. Such capabilities could significantly enhance economic development throughout the county and its environs.

Specifically, based on high level designs, the feasibility study will provide Clearwater county with a preliminary view of the business case associated with the deployment of broadband infrastructure and services throughout County. The business case will be completed in two phases. Phase 1 will provide a view based on deployment to a sampling of growth hamlets, a rural stretch of highway, the town of Caroline, and parts of Rocky Mountain House. Phase 2 will look at extending the view to encompass the majority of the county. The study will include strategic considerations, capital, operational, and revenue estimates, five and ten year ROI and NPV estimates, potential financing options, and next steps should Clearwater find the elect to move forward.

All work detailed within this proposal can be completed for $12,500 in fees and up to $2,500 in expenses, plus all applicable taxes. Assuming the contract is signed and the work is underway by January 1, the draft results will be available by January 16th and the results will be available for presentation to Council on January 18th, as per your request. Should approval's be delayed, a revised timeline will need to be agreed upon.

Proposal

Introduction

Historians and futurists Alvin and Heidi Toffler have warned that the impact of the information and communications technology (ICT) Revolution will be more transformative than commonly appreciated, because it marks a fundamental change in our systems of creating wealth. This has previously happened only twice in recorded history, i.e., when tribal hunter-gatherer systems evolved into more complex agrarian systems built around land and agriculture; and when these evolved into even more complex industrial systems built around machines.

Because of the Internet and related technologies, the world is now transitioning to even more complex economic systems built around *knowledge*.[1] The most significant impacts of this unfolding transition relate to economic innovation and productivity and societal organization. As a foundational cornerstone of these emerging systems of wealth creation, access to ICT has become critical to sustainable economic development in virtually every community and society on the planet.

Broadband initiatives have the potential to dramatically and positively impact the fabric of life throughout a community by offering exceptional network services; learn-in-place, work-in-place, and age-in-place opportunities for all generations; innovation and diversification in every economic sector; and positioning the town's brand as dynamic, progressive, and relevant to the future. Such development will make it easier to foster, retain and attract the youth needed to restore demographic balance in rural communities.

Recognizing the strong correlation between broadband capability and economic development, Clearwater County's Broadband committee has asked for a feasibility study associated with deploying broadband infrastructure and services within its boundaries. The primary output of the study would be the business case that is needed to inform committee and council discussions on whether or not to proceed with a pilot deployment or perhaps begin developing a strategy and proceeding with a more detailed conceptual level design and business plan.

The following sections provide an overview of the qualifications and experience our team brings to the table, an approach to meeting the County's requirements, and a proposed project budget and schedule.

Qualifications and Experience

Taylor Warwick Group Profile

TaylorWarwick is focused on positively impacting the telecommunications environment in Canada and leveraging broadband ICT to strengthen Canadian capabilities in research, innovation, and entrepreneurship. With its unique blend of academic and applied innovation experience and business acumen, economic models, and engineering capabilities, TaylorWarwick has become a leading Canadian-based consultancy dedicated to helping clients develop, deploy, and operate world class ICT infrastructure and service sets to their developments and municipalities. In so doing, TaylorWarwick not only enables clients to optimize economic development opportunities, but to compete with the best in class, anywhere in the world.

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[1] Toffler, A&H; Revolutionary Wealth; Knopf; 2006-04-25.

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Together, TaylorWarwick and the Olds Institute for Community & Regional Development (OICRD) successfully established the first and to date, only, sustainable community-based fibre-to-the-premise (FTTP) network in Canada: O-NET now offers every resident and business in Olds, Alberta, Gb/s services and a complete triple-play services portfolio.

TaylorWarwick, helped assess the potential economic, cultural, and social benefits of high-speed Internet access to communities in the Regional Municipality of Wood Buffalo, including Janvier, Fort Chipewyan, Fort Mackay, Anzac, Gregoire Lake Estates, and Conklin. Our strategic planning efforts provided a variety of novel hybrid fibre/wireless options capable of delivering reliable and affordable high-speed Internet access.

Taylor Warwick has provided executive leadership together with strategic, technology, and business planning services to the Alberta Southwest Regional Alliance, Cardston County, Waterton National Park, the Town of Pincher Creek, the Town of Raymond, the Township of Scugog, the City of Spruce Grove, the Olds Institute for Community & Regional Development (OICRD), the Oil Sands Leadership Initiative (Regional Municipality of Wood Buffalo), ViTel (County of Parkland, Lac Ste. Anne, Leduc, Greenview and Woodlands), Ventus, TELUS, Bell Canada, TRLabs, the Agile All Photonics Network research consortium, Western Economic Development Canada, Alberta Innovation and Science, and a number of startup companies.

Rounding out this expertise, TaylorWarwick brings to the table a comprehensive set of consulting, service, and supplier relationships that can be leveraged when required. TaylorWarwick has partnerships with e.Commerce Services for outside plant design and regulatory services as well as relationships with many equipment, construction, and operations providers. These relationships enable TaylorWarwick to ensure current design and accuracy in the underlying capital and operational costing information used in the financial models on which higher-level strategies depend. The integration of this expertise allows us to provide Clearwater County with unique, comprehensive, and unparalleled professional services for developing a broadband feasibility study. Our project management services ensure quality, timely delivery, and cost efficiency in all aspects of our work.

Taylor Warwick's principal, Craig has been recognized through his work on various Natural Sciences and Engineering Research Council (NSERC) of Canada committees, membership on the Awards Adjudication Panel of the Alberta Science and Technology (ASTech) Foundation, and position as VP and Director of the Canadian Telecommunications Consultants Association. He currently sits on the peer review committee for NSERC's Fellowships Innovation Platforms initiative and the Technology Committee of the OICRD. Craig is a professional engineer, and holds Masters degrees in both Science and Business Administration from Queen's University in Kingston. He is a Founding Director of Olds Fibre Limited and President of Taylor Warwick Consulting Limited.

Project Contact Information

The primary contact for this project will be Craig Dobson, President - Taylor Warwick Consulting Limited.

Financial Models

The accuracy of the TaylorWarwick financial models that will underlay this work arises from both their detail and the careful modeling of deployments across time. All major revenue and cost components scale based on estimated network and service deployment schedules.
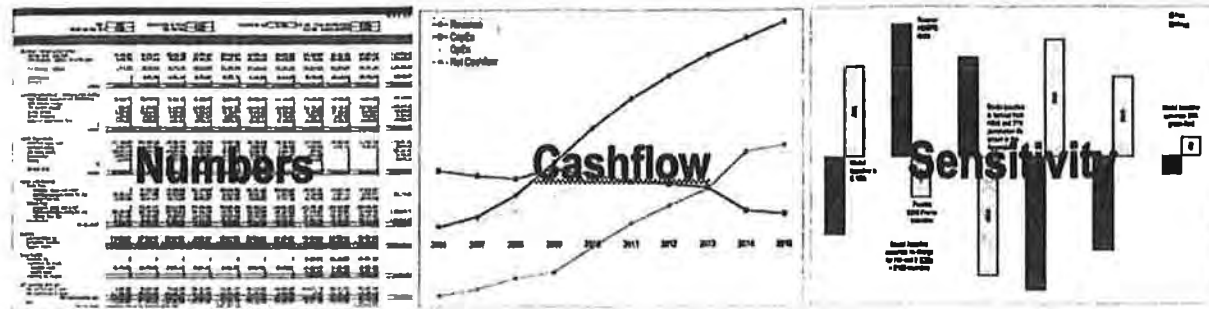
Representative Projects

Community Fiber Network and Service Deployment: O-NET

The Technology Committee of the OICRD sees the development of the Olds Connected Community Network as a key foundation for future economic development within Olds and the surrounding region. Now after a decade of intensive effort, three years of coordination and regulatory work by eCommerce services and five years of on-going coordination and guidance by TaylorWarwick, in July, 2013, Olds became the first municipal fibre network in Canada with gigabit per second internet, voice, and IPTV services to very home and business in the community. Following an extensive review of the available architectural, structural, and operational alternatives by TaylorWarwick, a two-entity structure was created. Ownership and operations of the passive dark fibre infrastructure became the responsibility of the OICRD and a for-profit entity branded O-NET was established to light and operate the network and develop and run a full slate of triple play services. The overall blueprint for the operation was provided by the financial models and Business Plan developed by TaylorWarwick.

Retail triple-play services revenue will enable O-NET to pay OICRD a set amount per client/month for use of their dark fibre infrastructure. At minimal residential and business penetration rates of 30% and 20% respectively, this revenue is sufficient for both the OICRD and O-NET to service their debt and become cashflow positive by 2015. Results from a market survey conducted in Olds by Twist Marketing over the July to September, 2010 period, found that 79% of respondents indicated a strong interest in fibre-based triple play services. Indeed, 50% penetration rates tend to be the norm in well run municipal FTTP deployments.

At this point O-NET has been established and O-NET is fully operational. Competitive triple-play services are available, fibre deployment has been completed, and the operation is now cashflow positive.

The Olds story appeared in the October, 2012 Broadband Communities magazine. The article may be found here http://bbcmag.epubxp.com/i/90470, starting on page 69.

First Nations: A Sustainable Hybrid Fibre / Wi-Fi Design

Though initially the Oil Sands Leadership Initiative engaged TaylorWarwick simply to develop a workable digital strategy for the Chipewyan Prairie First Nations Community in Janvier, this evolved into the development of an overall business case and strategy for extending broadband infrastructure to the regional and first nations communities throughout the Regional Municipality of Wood Buffalo (RMWB). Conceptual designs and capital cost estimates were provided for options ranging from a pure wi-fi to a

full home-run fibre deployment with a wi-fi overlay. Assuming community ownership and operational partners, these estimates were incorporated into detailed financial models that included parameters to vary deployment dates, services sets, business models, and to leverage RMWB proposed deployments. As SuperNet middle-mile offerings did not align with the regional requirements, e.Commerce Services was engaged to provide options.

Complementing this work, TaylorWarwick assessed the potential economic, cultural, and social benefits of high-speed Internet access in the RMWB communities of Janvier, Fort Chipewyan, Fort Mackay, Anzac, Gregoire Lake Estates, and Conklin. The resulting Benefits assessment estimated the off-balance sheet 'positive externalities' the various deployment options would enable and in the development of the business case, these were added to the revenue projections associated with the provisioning of standard Internet services. Whereas the ISP business case could only justify the traditional wireless solution, off-balance community benefits provided justification for an FTTP solution

Work Plan and Methodology

Approach

The financial analyses underlying the feasibility study require estimates of revenue together with capital and operational expenditures and to be meaningful, the model used to generate these estimates must represent, as closely as possible, that likely to be adopted by Clearwater County should they resolve to move forward and work through the numerous options available. Pending further discussion, the model that will be assumed for this work is illustrated below.

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Clearwater County   Broadband Feasibility Study
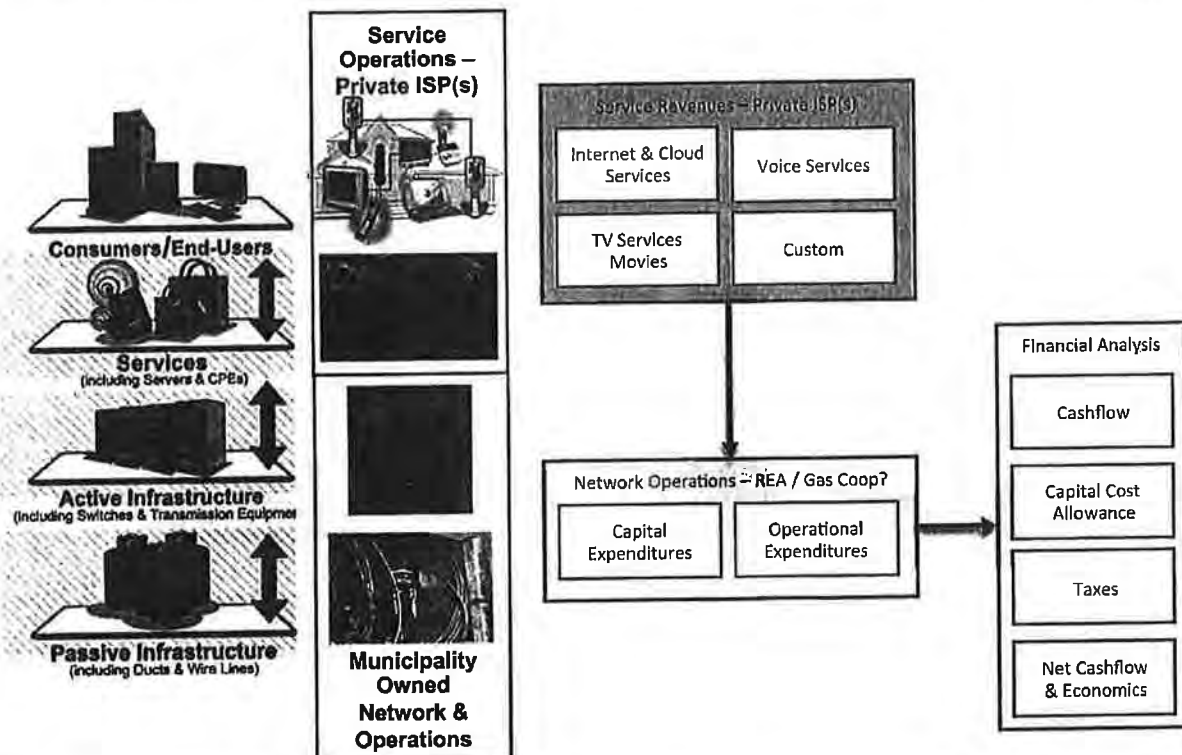
In summary, the County – possibly in partnerships with the regional REA, Gas Coop, or other entities – will arrange for and finance the network and secure contracts for its operations and maintenance. Services will be provided separately via one or more ISPs. The ISPs will collect the service revenue and then compensate the County for network access and operations. Once the build out is complete and profitability has been achieved, the proceeds will be split amongst contributing partners.

Given the two week timeline for the initial feasibility study, the estimates will necessarily be high level in nature. They will, however, provide a concrete view of the financials and provide a solid basis on which to run sensitivity analyses to evaluate risk and then appropriately scale a pilot project. The pilot deployment would be used to identify issues, train local crews, and refine the deployment estimates. The refined estimates would then be used to develop a more accurate view of the capital requirements and add confidence to the business case projections.

Methodology

Methodology for the Feasibility Study appears in the adjacent workflow diagram. To maintain close alignment with the interests of the County throughout the project, review meetings – shown in blue – will be scheduled to review the results of each stage of work.

To ensure initial alignment and begin to establish a working relationship, a kick-off meeting with the core project team is recommended. The meeting will provide an opportunity to review the requirements of the project in light of the approach outlined, engage community members in the data collection and support that will be required for the financial estimates to be as meaningful as possible, and provide a forum to review deliverables, schedule and budget, as well as enable us to improve our understanding of the community requirements that the overall project is to address.

The business case will be completed in two phases. Phase 1 will provide a view based on deployment to a sampling of growth hamlets (including Leslieville, Withrow, Condor, and Nordegg), a rural stretch of highway, Ferrier Acres, the town of Caroline, and parts of Rocky Mountain House. Phase 2 will look at extending the view to encompass the majority of the county. The study will include strategic considerations, capital, operational, and revenue estimates, five and ten year ROI and NPV estimates, potential financing options, and next steps should Clearwater find the elect to move forward.

The financial modeling work and initial business case work would then be completed, documented in a presentation format, and presented to the project team for review and feedback. Issues would then be resolved and the results finalized for a potential presentation to Council.
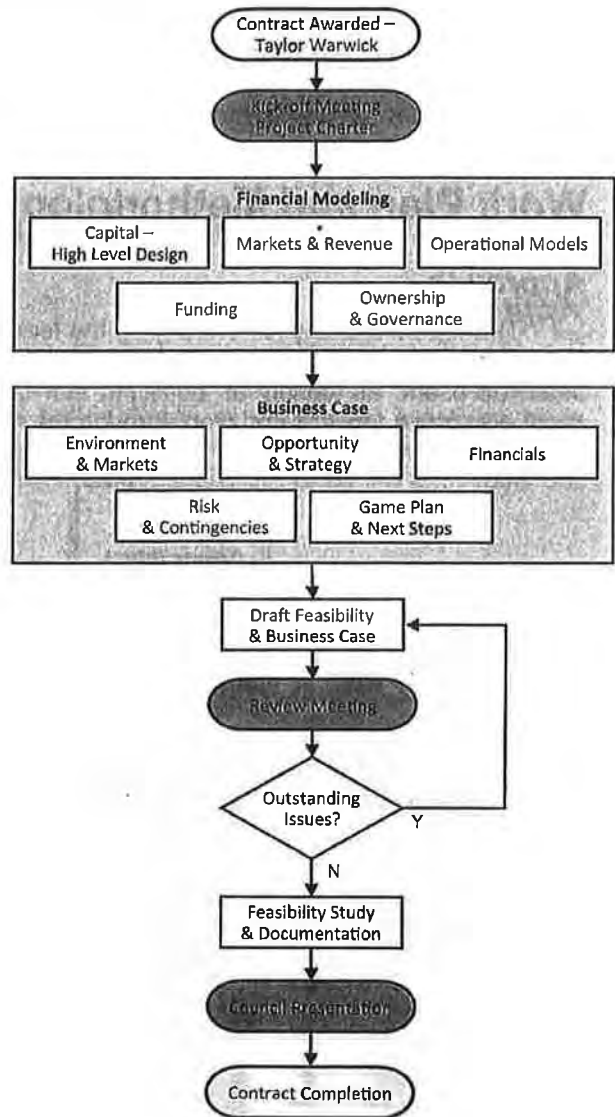
Schedule

The tentative schedule has the work commencing as soon as a contract is in place and then having draft results available by January 16th. Final results and a presentation are to be available by the morning of January 18th, 2016.

Fees and Expenses

The work proposed here will be completed at an overall cost of $12,500 plus up to $2500 in expenses plus GST. The expenses are to cover travel – expenses are recovered at cost and mileage is invoiced at $0.54/km. Billing will be in two parts: $10,000 for the completion of the draft feasibility study for the 18th and the balance on receipt of final project deliverables.

Proposed Changes

Certainly there are a number of areas within the proposed work where clarification will be appreciated, but these are things we can work through at the Kick-off meeting. We believe, though, that the feasibility study proposed herein will provide Clearwater County with the context and quantitative understanding the broadband option on which they can move forward with confidence.

Acronyms

AlbertaSW	Alberta Southwest Regional Alliance
FTTP	Fibre-to-the-premise
Gb/s	gigabit per second (10^9 bits per second)
ICT	information and communications technology
ISP	Internet Service Provider
NPV	net present value
NSERC	Natural Sciences & Engineering Research Council
OICRD	Olds Institute for Community & Regional Development
RMWB	Regional Municipality of Wood Buffalo
RoI	return on investment

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Regional Broadband Investigation

Needs, Opportunities, and Approaches At the Local Level and for the Calgary Region

Landscape Issues

Calgary Regional Partnership

Prepared for The Calgary Regional Partnership
by Taylor Warwick Consulting Limited

August 14, 2016

Calgary Regional Partnership

August 2016

A note of introduction and thanks.

Existing communications networks are transitioning from copper to fibre as the world evolves to a knowledge-based economy. Important decisions will be made in every community and region about how, and how quickly that happens, and by whom. Certain community benefits may be realized or lost in the transition depending on how it takes place.

Many municipal leaders are considering what role their municipalities could or should take in ensuring enhanced broadband services and digital connectivity networks evolve to support local businesses, residents, municipal service delivery and capacity for distance learning, home-based health care and other web-based public services. "What to do about this transition to fibre? Is it more risky to jump in, or more risky to be left behind?"

To better inform decision-makers in the Calgary Region we commissioned Craig Dobson, Principal at *Taylor Warwick Consulting*, to develop a broadband "backgrounder" that could help us better understand what this is all about, why municipalities and regions should become engaged in this transition, and what municipal involvement could look like.

We appreciate the financial and staff contributions our partners have made in supporting the development of this document. We hope that it will be widely shared and thoughtfully read.

Sincerely,

Mayor Bill Robertson, Town of Okotoks

and Chair, *Calgary Regional Partnership* and
Calgary Region Economic Development Alliance (REDA)
Calgaryregion.ca

Alberta Economic Development and Trade

BOW VALLEY COLLEGE

Calgary

Calgary Regional Partnership

Okotoks

PALLISER ALBERTA SOUTHEAST

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1 Executive Summary

Because of the Internet and related technologies, the world is now transitioning to more complex economic systems built around *knowledge*.[1] The most significant impacts of this unfolding transition relate to economic innovation, productivity, and societal organization. As a foundational cornerstone of these emerging systems of wealth creation, access to information and communications technology (ICT) has become critical to sustainable economic development in virtually every community and society on the planet.

In spite of the foundational nature of the required underlying connectivity infrastructure, Canada has yet to develop meaningful related technology policy or sway from its half-century-old policy of facilities-based competition in the telecom space........... and the results speak for themselves. According to the Organization for Economic Co-operation and Development (OECD) and the Conference Board of Canada respectively, Canada now ranks 14th in Broadband and in Innovation. More telling is a comparison between Internet service availability here and in, say, Västerås, Sweden. Whereas at most locations in Canada one may have the option of two wire-line providers, in Västerås, there are over thirty.

For the benefit of all communities within the region, the Calgary Regional Partnership (CRP) has elected to face and deal with the issues head-on. The importance of perspective cannot be understated and this reports brings together the underlying context, rationale, and related data and statistics to provide an overall view of the landscape that frames both the issues to be dealt with and the potential solutions that will be found.

2 Problem Definition

Recognizing both the opportunity and challenge associated with facilitating advanced fibre optic-based broadband infrastructure and services within the CRP region, the CRP commissioned this study to identify and organize a research and analysis framework for moving the discussion in the Calgary Region forward. It's overall purpose is to generate new information about Broadband availability throughout the region, identify and explore key strategic opportunities and, ultimately, inform decision-makers around the types of choices they might consider at local and region-wide levels to strengthen the delivery and affordability of high-speed broadband services across the Calgary region.

Recognizing the importance of being inclusive, for the purposes of this study, CRP has invited all incorporated entities in the region to participate – both Partnership members and non-members alike. The study therefore incorporates the aggregated issues and wisdom encompassing the 3 cities, 12 towns, 5 villages, 2 summer villages, 2 municipal districts, and 2 counties within the Calgary region.

The overall project has been broken into three parts – (1) Landscape Issues, (2) Municipal Opportunities, and (3) Regional Opportunities. This document is Part 1 and focuses on the landscape Issues and context. It is intended to provide overall perspective and context to the work that will follow.

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[1] Toffler, A&H; Revolutionary Wealth; Knopf; 2006-04-25.

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3 Key Take-Away Points

- ***Our system of wealth is changing*** – Compounding the impacts of both the Industrial and the current Information & Telecommunications revolutions is the fact that they ushered in a new system of wealth. With a change in the wealth system, what made communities successful in the 20th century no longer works today. We are moving from a world in which scalable efficiency generated the most value to one in which scalable peer learning does. (p. 5)

- ***Transitioning to higher skilled workforce*** – While the 'hollowing out' of the middle class is not as evident in Canada as it is in the US, the number of medium and low skilled jobs is declining relative to those requiring higher skill levels. From both the perspective of retraining the folks displaced and creating higher skilled jobs for them, broadband is key. (p. 56)

- ***Canada is losing ground*** – As of early 2016, Canada ranked 14th in terms of mean available download bandwidth, 18th in terms of cost, and 23rd in terms of fibre penetration. Whereas in Korea, the average download bit rate of 23.6 Mb/s is available for $ 1.77/mo. (13.3 Mb/s/$), in Canada, one can only expect 9.7 Mb/s for $8.00/mo. (1.21 Mb/s/$). (p. 7)

- ***Alberta is not keeping up*** – Alberta ranks 11th out of 13 provinces and territories based on download speed – and Alberta has the SuperNet. Alberta's two largest cities do not fair well either – Calgary and Edmonton are respectively ranked 11th and 21st out of 25. (p. 9)

- ***Everyone could win*** – Economic development is not a zero-sum game in which the winning community takes all. Together, the CRP members and non-members can raise the 'tide' of prosperity across the region so that all can benefit. (p. 40)

- ***Accomplish more together*** – The municipalities, municipal districts, and counties can accomplish more together than separately, ensuring that none are left behind. (p. 58)

- ***Too important to miss!*** – As the required infrastructure upgrades represent a once in a century opportunity, it is worth getting this right. (p. 25)

- ***Fibre as a utility*** – Scalable broadband connectivity is critical civic utility infrastructure and should be treated as such. In the US, 25 of the 48 states reporting have a broadband office. (p. 7)

- ***Reduced rates as a long-term investment*** – As municipalities and regions can fund fibre infrastructure over 20+ year periods, they can provide the infrastructure much less expensively than can a private interest firm intent on recouping its capital in, say, five years. Monthly payments by a community on a $1M infrastructure loan over 20 years at 2.602% from the Alberta Capital Finance Authority (ACFA) are $5,349 versus the $18,417/month payments required of a private firm paying 4% on the same amount over a five year term. (p. 68)

- ***Update Provincial and Federal Frameworks*** – Both federally and provincially, funding and debt limit policies need to be updated to help enable municipalities to deploy the required infrastructure; regions are an important voice for change. (p. 68)

- ***Promoting services-based competition*** – Federally, the Canadian Radio-television and Telecommunications Commission's (CRTC's) options are inhibited by the facilities-based framework under which it operates. Moving to a services-based framework in which the required underlying fibre infrastructure is provided on an open basis as a fourth utility over which all providers can compete on services would enable ubiquitous deployment and help eliminate the existing digital divide. Under a services-based model, private providers would get

access to infrastructure superior to that which they themselves could afford to deploy and could then re-direct the capital saved to innovate and compete on services. (p. 13)

- *Independent triple-play service providers are now available* – As independent triple-play service providers such as O-Net, VMedia, and Novus are now available, the options available to underserved communities wishing to deploy their own fibre-based networks are expanding. (p. 14)

- *Enhancing broadband is a largely social enterprise* – It has been said that community fibre endeavours are likely 80% social and 20% technical and the Olds' experience supports this from several perspectives. (p. 58)

- *Required Internet capacity continues to grow geometrically* – Both Internet and mobile traffic growth remains robust at a compound rate of 21% and 69% annually. The video portion of that traffic is increasing at 64% and 55% respectively – and not all of this is Netflix. (p. 11)

- *Wireless has limits; fibre does not* – The trade-off between fibre and wireless tends to change over time and depends on available capital, local priorities, and the relative importance of off-balance benefits. A common misconception is that wireless systems are less expensive. While they may be so over a 3 to 5 year period, their ability to expand is limited and over a ten year timeframe when capacity expansion is considered, can prove to be even more expensive than fibre networks. (p. 40)

4 Context

4.1 Project[2]

The Calgary Regional Partnership, in collaboration with local member and non-member municipalities, municipal districts, and counties, Provincial staff, and partner organizations in the Calgary Region, has initiated an exploration of very high-speed broadband fibre opportunities, needs, benefits and strategic approaches relevant to the Calgary Region and its environs.

Accessible, affordable and reliable high-speed Broadband services, provided in a coordinated and interconnected system, is seen as foundational to supporting economic prosperity locally and regionally, enabling greater social connectedness and well-being of the region's population, and promoting environmental integrity across the region.

High-speed Broadband services provide foundational infrastructure for community prosperity, resiliency and quality of life – not unlike roads, electricity, water and wastewater and other essential utilities that support economic activity and community life – all supportive of achieving shared regional Vision and outcomes as expressed in the *Calgary Metropolitan Plan (CMP)[3]*.

Recent preliminary discussions, benefiting greatly from the active support of the Olds Institute (and O-Net), the Alberta Southwest Regional Economic Development Alliance (REDA), Bow Valley College, and staff from the Province's SuperNet initiative have together begun to frame a series of strategic opportunities worth exploring at both local and region-wide scales. Subsequent discussions with the author have further focused the information to be researched and documented, describing the questions to be analysed and the types of strategic choices that could be available to communities in the region.

4.2 A Techno-Economic Framework

Over the past three hundred years, the robust links between innovation, technical and institutional change, and economic development have played out in the first four techno-economic revolutions outlined in the table below and are currently playing out in the fifth – the Age of Information Technology and Telecommunications.[4]

1771	The 'Industrial Revolution' (machines, factories, and canals)
1829	Age of Steam, Coal, Iron, and Railways
1875	Age of Steel and Heavy Engineering (electrical, chemical, civil, naval)
1908	Age of the Automobile, Oil, Petrochemicals, and Mass Production
1971	Age of Information Technology and Telecommunications
20??	Age of Biotech, Bioelectronics, Nanotech, and new materials?

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[2] Miller, B.; *Preliminary Scoping Documents to Explore HighSpeed Broadband Needs, Opportunities and Approaches at the Local Level and for the Calgary Region*; CRP; 2015-07.

[3] Calgary Regional Partnership; Calgary Metropolitan Plan; 2012-07-21.

[4] Perez, Carlota; Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages; Edward Elgar Publications; 2003.

Each technological revolution lasts between 40 and 60 years and propagates through two strikingly different stages – the installation and the deployment phase. As illustrated in the figure, based on the introduction of a new technology, during the installation phase, entrepreneurs move in to capitalize on it. They attract new investment capital away from existing businesses and based on market experiments, establish new types of business organizations to deal with it. The resulting maelstrom of activity eventually reaches a climax and ends in a stock market crash.

Industrial/production capital then comes to the table and finances the reasoned deployment of the underlying infrastructure required to enable the full economic and social potential of the new paradigm. In this second – deployment – stage,

innovation occurs across all economic sectors and the social benefits become widespread. As the commercial benefits take hold, the collective interests of the populace at large become part of the equation and state capital comes to table to complete the deployment in commercially unattractive areas.
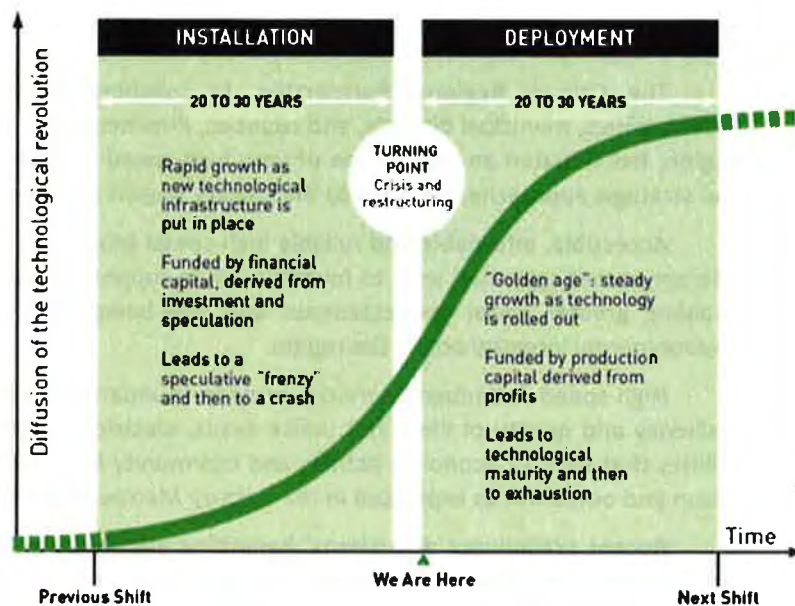
From this perspective, the five techno-economic revolutions to date map out as shown in the figure on the next page.[5] The displacement of the older established order as the new technology wave develops is not typically smooth. Compounding the impacts of both the Industrial and the current Information & Telecommunications revolutions is the fact that they ushered in a new system of wealth [see Sec. 7.1, The Knowledge Economy].

The congruency here with the development of the Internet and the underlying enabling broadband infrastructure is striking. The crash took place in 2001 and now, some 15 years later, the true benefits of the ICT revolution are impacting every sector of the economy. The positive externalities[6] are becoming self-evident and governments are stepping in to ensure near ubiquitous deployment (at least those outside North America). Aligning these events with this timeline indicates that we are about 60% of the way through the ICT revolution. As discussed in the following sections, developing technology, financial, economic, and policy objectives to maximize the benefits of the new paradigm as broadly as possible is an interesting challenge.

It is at this stage – where we are now – that the debate as to whether this new technology will focus largely on private benefits (broadband fibre as a market commodity) or public benefits (broadband fibre as a utility to achieve purposeful public benefits) will be decided. Who owns and controls the fibre assets will be key to how well they achieve broader public benefits now that the emerging technology is more available.

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[5] Trends Magazine; *A New Golden Age… When People Least Expect It*; AudioTech Inc.; 2010-04.

[6] Externalities relate to side effects or consequences of industrial or commercial activities that affect other parties without this being reflected in the prices or costs of the goods or services involved. [Wikipedia]

Five Business / Technology Revolutions
1771 — 2031

	INSTALLATION	Collapse & Readjustment	DEPLOYMENT
Technology is not kind... *It does not wait...*	**INDUSTRIAL REVOLUTION** 1771	**CANAL** **PANIC 1797** **(BRITAIN)**	• Diffusion of manufacturing with water power • Full network of waterways (canals, rivers, oceans) • Development of public companies
It does not say please...	**STEAM & RAILWAYS** 1829	**RAILWAY** **PANIC 1847** **(BRITAIN)**	• Economies of scale • Joint stock companies • Repeal of tariff laws/free trade
It slams into existing systems... *And often destroys them...*	**STEEL, ELECTRICITY & HEAVY ENGINEERING** 1875	**GLOBAL COLLAPSES OF THE 1890'S** **(ARGENTINA, AUSTRALIA, U.S.)**	• Transcontinental rail, steamships and telegraph • Gold standard, global finance
While creating a new system.[7]	**AUTOMOBILES, OIL & MASS PRODUCTION** 1908	**GREAT CRASH OF 1929** **(U.S.)**	• Interstate/international highways and airways • Welfare state, Bretton Woods, IMF, World Bank
	INFORMATION & TELECOMMUNICATIONS 1971	**NASDAQ CRASH 2000 & GLOBAL COLLAPSES (ASIA, ARGENTINA, U.S.)**	• Global digital telecommunications network • Institutional framework, facilitating globalization

4.3 Technology as Policy

The complexity and depth of the required alignments is brought home in the recently released World Development Report on the *Digital Dividends*.[8] According to the report, while *digital technologies have spread rapidly in much of the world, digital dividends (i.e., growth, Jobs, and services) —the broader development benefits from using these technologies—have lagged behind. In many instances digital technologies have boosted growth, expanded opportunities, and improved service delivery. Yet their aggregate impact has fallen short and is unevenly distributed. For digital technologies to benefit everyone everywhere requires closing the remaining digital divide, especially in Internet access. But greater digital adoption will not be enough. To get the most out of the digital revolution, countries also need to work on the "analog complements"—by strengthening regulations that ensure competition among businesses, by adapting workers' skills to the demands of the new economy, and by ensuring that institutions are accountable.* These 'analog complements' will be discussed in Sec. 7: Infrastructure vs. Digital Dividends.

According to *Digital Dividends*, there are two sides to the connectivity piece. While our primary focus here is resolving supply side issues in ways that both maximize the benefits while minimizing the risks mentioned above – and sections dealing with the key components of the connectivity issues follow[9] – many issues on the demand side are serious and, while well beyond the scope of this work, need to be noted before moving on.

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[7] Enriquez, Juan; <u>As the Future Catches You: How Genomics & Other Forces Are Changing Your Life, Work, Health & Wealth</u>; Crown Business; 2005-10-25.

[8] World Development Report; Digital Dividends; World Bank; 2016-03.

[9] The invisible mile refers to wireless access and the associated spectrum management policies.
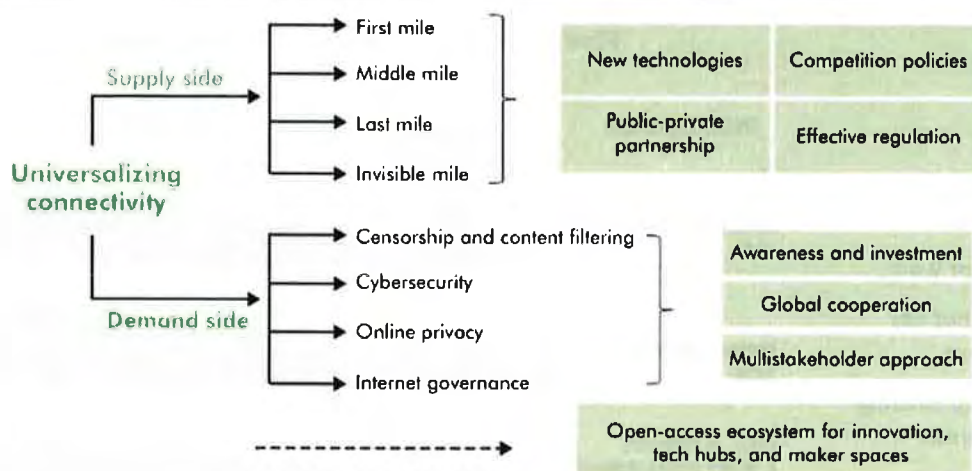
The challenges facing Internet stakeholders [on the demand side] *today are as much about how networks are used (demand) as how they are built (supply). Global interconnectedness introduces new vulnerabilities in areas where coordination mechanisms are weak, still evolving, or based on nongovernment models. Threats to cyber- security, and censorship are undermining confidence and trust in the Internet and increasing costs to businesses and governments, resulting in economic losses as well as higher security spending. For privacy and data protection, different countries are taking quite different approaches. That makes it harder to develop global services. Ensuring safe and secure access will require enhanced international collaboration, based on a multi-stakeholder model.*

4.4 Political

As foreign governments recognize the merits of open utility-based fibre infrastructure, Canada is falling increasingly behind. To date, neither the federal nor provincial governments have yet placed the emphasis on technology policy to address broadband to the extent evident internationally. Though the initiative has since changed course, in 2009, Australia announced plans to spend AUD$31 billion on a National Broadband Network. In 2013, France pledged €20 billion for superfast broadband. In the US, of 48 reporting states, 25 have established a broadband office.

The impact of this lack of policy is evident in the OECD statistics charted below[10]. As of early 2016, Canada ranked 14th in terms of mean available download bandwidth, 18th in terms of cost, and 23rd in terms of fibre penetration. Whereas in Korea, the average download bit rate of 23.6 Mb/s is available for $ 1.77/mo. (13.3 Mb/s/$), in Canada, one can only expect 9.7 Mb/s for $8.00/mo. (1.21 Mb/s/$). Fibre penetration in Korea is 69.39% compared to 5.32% in Canada. Even more telling is a comparison between Internet service availability here and in, say, Västerås, Sweden. Whereas at most locations in Canada you may have the option of two wireline providers (TELUS and Shaw in Western Canada), in Västerås, there are over thirty.

At least part of the issue is the Federal government's belief in facilities-based competition – versus a services-based regime in Sweden – and the incumbents' concomitant refusal to provide services to those communities that manage to deploy fibre infrastructure themselves. While the incumbents cannot justify fibre builds in the less populous areas from a business perspective themselves, they boycott community networks that make the infrastructure available for them to compete on.

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[10] http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm#map

The federal government's Connecting Canadian's program which closed in 2015 focused on the provisioning of wireless broadband speeds of 5 Mb/s down/1 Mb/s up to all rural locations in the country. In today's world, 5/1 Mb/s is sorely inadequate from many perspectives and wireless systems do not scale well. For economic development, anything less than symmetric 100 Mb/s service is no longer considered competitive.[65]

Bandwidth

Pricing in Canadian $
OECD Stats as of 15-05

Country	Average Mb/s
Korea	23.60
Japan	14.60
Switzerland	12.70
Netherlands	12.40
Sweden	11.60
Czech Republic	11.20
Finland	10.73
Ireland	10.69
Denmark	10.55
United States	10.51
Norway	10.10
Belgium	10.00
United Kingdom	9.90
Canada	9.70
Austria	9.40
Israel	8.50
Germany	8.10
Iceland	8.02
Hungary	7.48
Poland	7.47
Slovak Republic	7.30
Spain	7.20
Slovenia	6.90
Estonia	6.77
Luxembourg	6.69
France	6.60
Portugal	6.40
Australia	6.00
New Zealand	5.60
Greece	5.25
Italy	5.20
Turkey	5.00
Mexico	4.00
Chile	3.30

Cost

Country	Average $ per Mb/s per Month
Israel	1.51
Belgium	1.51
Korea	1.77
United Kingdom	1.85
Portugal	2.14
New Zealand	2.31
Netherlands	2.53
Austria	3.05
Slovak Republic	3.47
France	4.31
Luxembourg	4.53
Denmark	4.72
Italy	4.81
Estonia	5.31
Australia	5.36
Iceland	5.84
Greece	7.44
Canada	8.00
Czech Republic	8.07
Switzerland	8.80
Finland	9.21
Chile	10.82
Sweden	12.65
Norway	13.54
Hungary	14.27
Germany	17.48
Japan	19.69
Slovenia	26.88
Mexico	33.88
Spain	34.98
Ireland	36.77
United States	39.35
Turkey	46.17
Poland	127.56

Fibre Penetration

OECD Stats as of 16-02

Country	Percentage of Fibre Connections in Total Broadband Subscriptions
Japan	72.61%
Korea	69.39%
Latvia	59.73%
Sweden	46.04%
Estonia	33.13%
Norway	31.08%
Slovak Republic	26.34%
Iceland	25.86%
Portugal	24.07%
Slovenia	23.23%
Denmark	22.51%
Turkey	17.19%
Spain	16.90%
Hungary	15.53%
Czech Republic	14.39%
Switzerland	13.96%
Netherlands	11.40%
Luxembourg	11.10%
United States	9.40%
Mexico	8.52%
New Zealand	7.48%
Australia	6.37%
Canada	5.32%
Italy	4.91%
Poland	4.79%
Chile	4.69%
France	4.34%
Finland	3.87%
Colombia	2.12%
Austria	1.50%
Germany	1.29%
Ireland	0.33%
Belgium	0.18%
Greece	0.17%

Ottawa's recent 2016 budget proposed up to $500M over five years, starting in 2016-17, for a new program to extend and enhance broadband service in rural and remote communities.[11] In contrast to the Connecting Canadians program, their current discussion document proposes a focus on the backhaul links required to connect remote communities to the global Internet. Irrespective of its shortcomings, as Alberta's SuperNet was deployed to do just that, it may be difficult for Alberta-based organizations to qualify.

As shown in the figure on the next page, Alberta ranks 11th out of 13 provinces and territories based on download speed – and Alberta has the SuperNet. Even Alberta's two largest cities do not fair well – Calgary and Edmonton are respectively ranked 11th and 21st out of 25.[12] A more detailed city comparison from the report appears in the chart on the next page.[13]
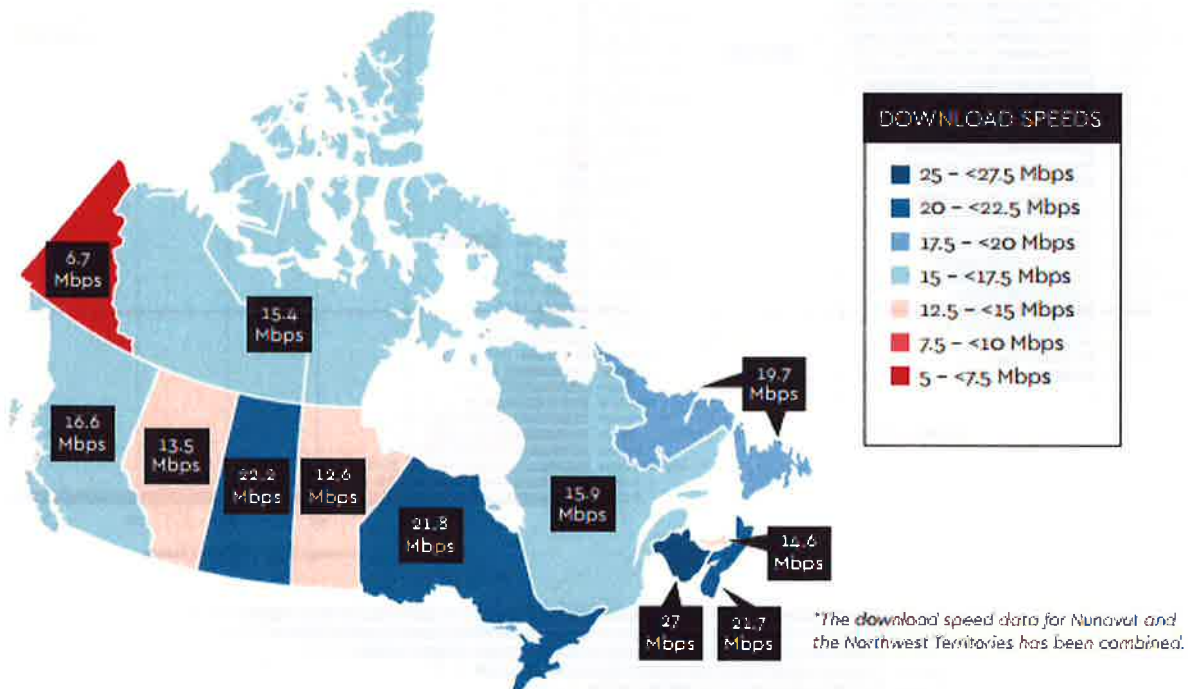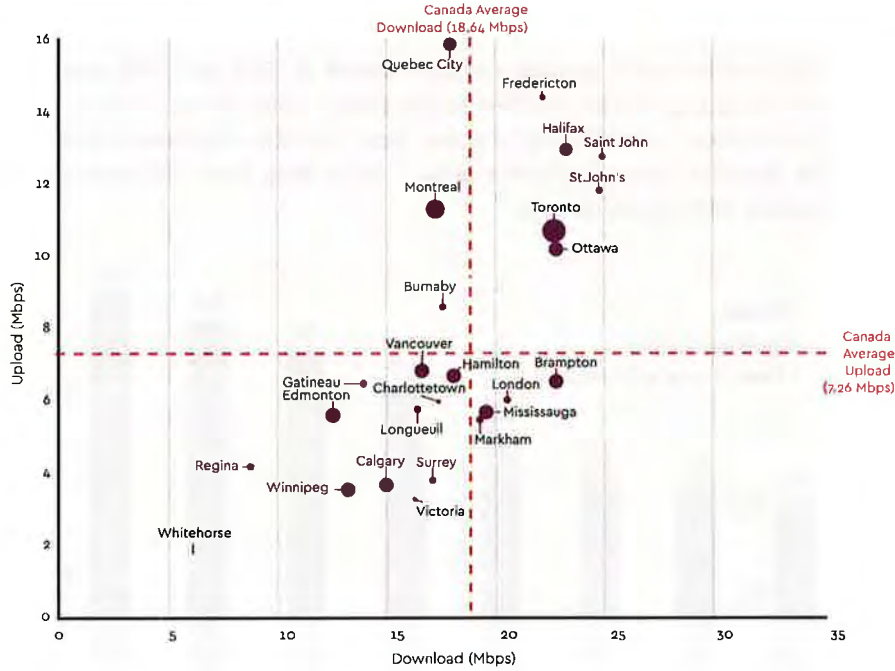

4.5 Social

As we move from an industrial to a knowledge-based society, from a society based on physical effort to one based on mental effort, and from reliance on limited material resources to dependence on virtually unlimited intangible resources, we fundamentally enable the acceleration of change. – Fred Harmon

The great value of the Internet is that it provides a substrate that not only connects more people and devices (and allows more applications to flourish), but that it enables new ideas and new forms of social organisms to emerge. – Susan Crawford

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[11] Innovation, Science and Economic Development Canada; *Increasing High-speed Broadband: Dialogue with Telecommunications Providers*, Spring 2016

[12] CIRA; Canada's Internet Performance: National Provincial and Municipal Analysis; 2016-04.

[13] In the chart, the size of the circle is proportional to the size of the city.

Shifts in economic and social organization among online communities have produced fundamentally new kinds of institutions for creating culture and exchanging knowledge. The rise of "nonmarket and nonproprietary" peer production by volunteers cooperating via the Internet on such projects as Linux and Wikipedia is the wellspring of all sorts of hope. Such voluntary global collaboration has the power to act as a mechanism to achieve improvements in human development everywhere. – Yochai Benkler

When social communication media grow in capability, pace, scope, or scale, people use these media to construct more complex social arrangements—that is, they use communication tools and techniques to
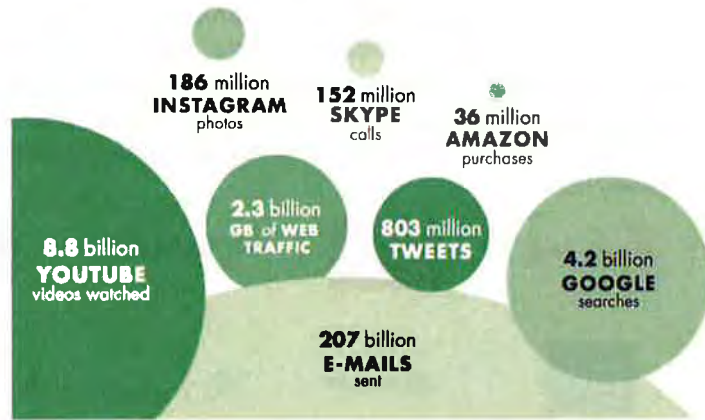
Sources: World Development Indicators (World Bank, various years); WDR 2016 team; http://www .internetlivestats.com/one-second/ (as compiled on April 4, 2015). Data at http://bit.do/WDR2016-FigO_4.

increase their capacity to cooperate at larger and larger scales. Human history is a story of the co-evolution of tools and social practices to support ever more complex forms of cooperative society. – Institute of the Future.

Though the impact of the Internet on Society has been both extraordinary and broad, we are still early in the deployment phase and the impacts will only increase. According to Harvey Balls, the benefits and key impacts to date have largely been in the consumer and business sectors – the gains in the other sectors are yet to be

Sector of Economy / Society, USA	Internet Impact, to Date
Consumer	
Business	
Security / Safety / Warfare	
Education	
Healthcare	
Government / Regulation / Policy Thinking	

realized.[14] This is discussed further in Sec. 7.5.

Both Internet and mobile traffic growth remains robust at 21% and 69% annually. The video portion of that traffic is increasing at 64% and 55% respectively – and not all of this is Netflix. Views of user generated or shared content is continuing to grow. Most recently, Facebook video views grew to 4 billion per day, a 400% increase from six months prior.[13] On a daily basis, the average US adult now spends 5.6 hours interacting with digital devices.[13]
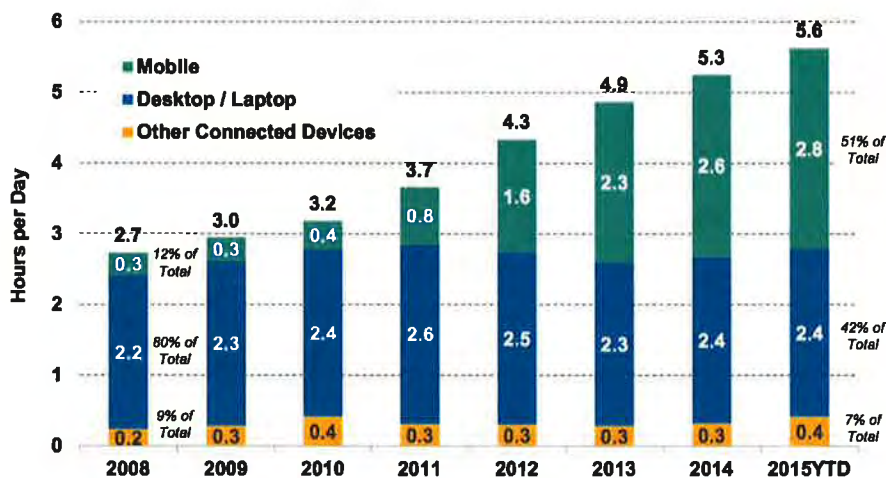
This usage is impacting many aspects of how we live and work. *A majority of US consumers are multichannel shopping, with 69% Webrooming (browse products online and buy in-store), and 49% Showrooming (browse products in-store and buy on-line).*[15] 97% of all consumers search for local businesses online.[16] People are increasingly creating supplemental incomes through online platforms and market places like Airbnb, Etsy, Thumbtack, Uber, and Upwork.[13] As business adapts, many products, services, and even work engagements are becoming available almost on a demand or as needed basis.[13]

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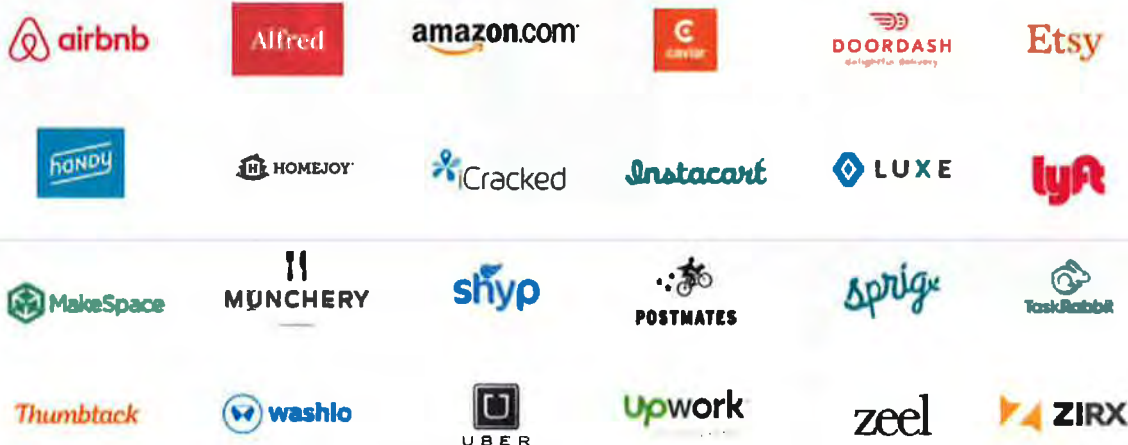
[14] Meeker, Mary; *Internet Trends, 2015 – Code Conference*; KPCB; 2015-05-27.

[15] Harris Interactive; *Showrooming and Webrooming in the 2014 Holiday Shopping Season*; 2015

[16] SocialTimes; *Social Media Business Statistics, Facts, Figures & Trends*; 2015

In terms of work, according to the World Economic Forum, *we are seeing an era of unprecedented change in the way we work. Rapid advancements in the fields of technology, such as artificial intelligence and machine learning, and in how we create things, such as robotics, nanotechnology, 3D printing and biotechnology, will dramatically change the characteristics of the global workforce.* Indeed, 35% of the required core skills will change between 2015 and 2020.[17] *Goods-producing jobs have been declining for decades and now represent only 15% of all US jobs.*[13] *50% of the US jobs lost in the 2008 recession were middle-skilled jobs, but only 2% of the jobs gained since the recession have been middle-skilled.* [18]
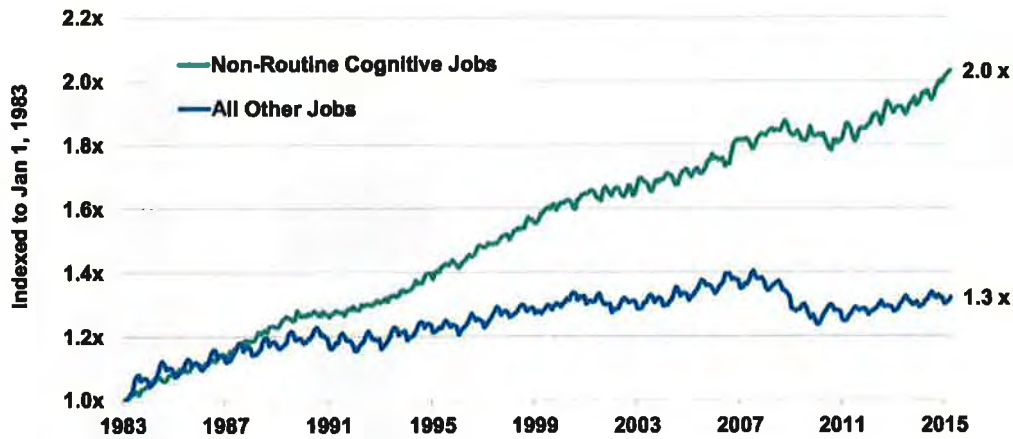
Skills Disruption

35% of core skills will change between 2015 and 2020

Disruption across countries and industries

		48%	Italy
		42%	India
		41%	China
		41%	Turkey
		39%	South Africa
43%	Financial Services & Investors	39%	Germany
42%	Basic & Infrastructure	38%	France
39%	Mobility	37%	Mexico
35%	Information & Communication Technology	31%	Brazil
33%	Professional Services	29%	United States
30%	Energy	28%	United Kingdom
30%	Consumer	27%	Australia
29%	Health	25%	Japan
27%	Media, Entertainment & Information	21%	Gulf Cooperation Council
		19%	ASEAN

average disruption

Knowledge-based, non-routine cognitive jobs requiring high skill levels, flexibility, creativity, and problem solving are growing faster than routine ones.[13] These types of work lend themselves to more flexible working relationships and freelance workers now account for 34% of the US workforce.[11] *By 2019, approximately one quarter of the entire US workforce will be independent workers (self-employed, independent contractor, freelancer, temp contractor, etc.).*[19] By 2030, 10% of the largest companies in the US will be virtual corporations (less than 10% of their workers will be in an office at any point in time).[20] Without broadband, participating in this economy will not be possible.

Non-Routine Cognitive Jobs vs. All Other Jobs Growth, USA, 1983 – 2015 (Indexed to Jan 1, 1983)

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[17] Gray, A.; *5 million jobs to be lost by 2020*; World Economic Forum; 2016-01-16

[18] http://futurehrtrends.eiu.com/infographics/the-cratering-of-the-middle-class/

[19] MBO Partners; *Independent Workers and the On-Demand Economy*, & US Bureau of Labour Statistics

[20] Rawson, R.; *20 Dramatic Predictions for 2030*; Staff.com; 2013-04-13.

Not surprisingly, wage growth directly correlates with the increased penetration of digital tools and technologies in business. Specifically, wage growth is 70 to 100 percent higher than the national average in industries with higher levels of digital adoption.[21]

Wage growth, 1997–2014
Compound annual growth rate of mean nominal wage, %
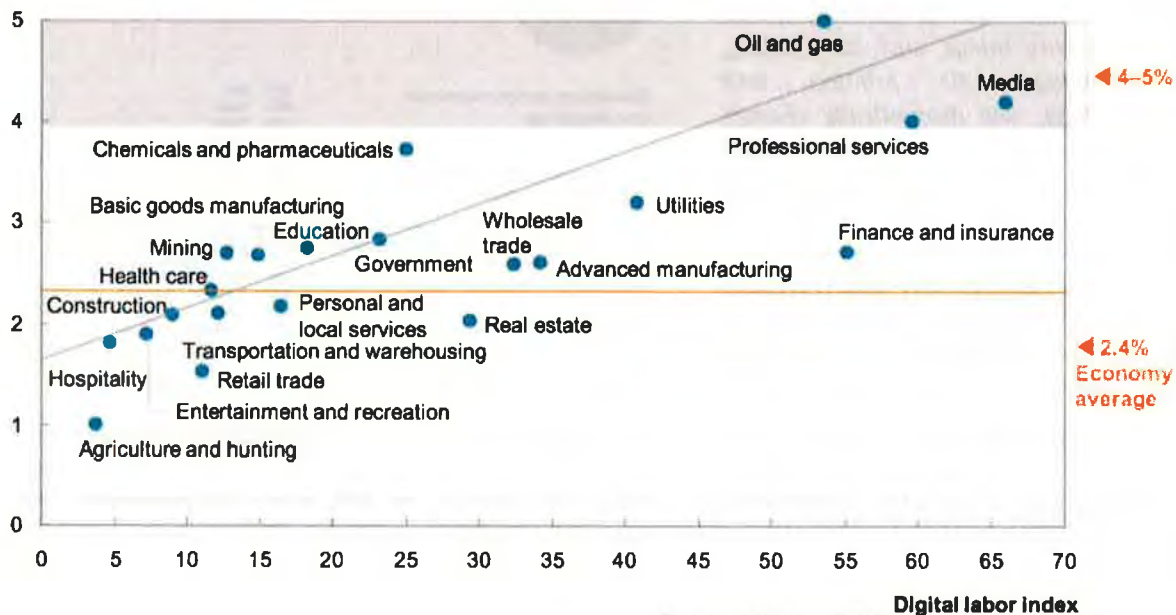
Digital labor index
Composite index of digital capital deepening, and share of occupations and tasks that are digital

4.6 Regulation

4.6.1 Telecommunications Regulation

4.6.1.1 Facilities-based Competition

Developed under a federal policy of facility-based infrastructure competition dating to an era in which telecommunication and broadcast networks could only support the services for which they were designed, incumbent telecom and cable companies operate on a vertically basis and, as illustrated on the left side of the adjacent figure, only provide services to customers over facilities they own and operate[22]. As any potential new entrant must therefore build its own physical network in order to provide services, the net result of this practice is severely restricted competition and redundant (often inferior) infrastructure.
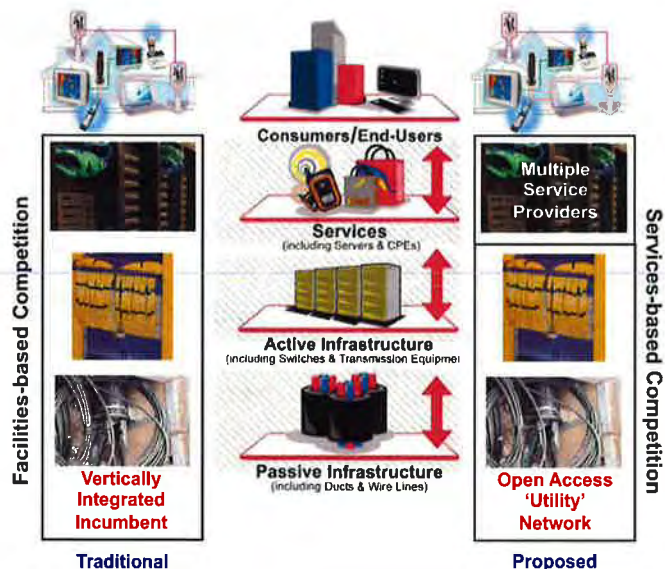
[21] Manyika, J., et al; Digital America: A Tale of the Haves and Have-Mores; MGI; 2015-12

[22] The carriers themselves do use wholesale relationships to interconnect their networks.

Given the significant capital expenditures associated with deploying civil infrastructure, the services-based models becoming prevalent in Europe, and depicted on the right hand side of the above figure, may now make sense. In this model, a single capable fibre-optic based network is deployed as an open access utility and to which any service provider so inclined can connect and provide services. This removes the expense of building multiple networks and opens up market competition (and promotes innovation) in the services space. This has not worked in Canada to date, as independent service companies willing to provide services over community networks have not been available. Without services, community networks cannot achieve the revenue streams required to service the debt acquired to deploy their networks. As independent triple play service providers such as O-Net, VMedia, and Novus are now available, however, the options available to underserved communities wishing to deploy their own fibre-based networks are expanding.

4.6.1.2   Wholesale Fibre Access Hearings

The telecommunication and broadcast industries in Canada are governed by the CRTC. To help promote services-based competition in Canada, the CRTC spent much of the 2014-15 period evaluating policies related to mandating wholesale service provider access to underlying incumbent fibre access networks and, in the end, elected to do so.[23] According to their July 22, 2015 ruling[24], the incumbent carriers will have to provide wholesale access to their access fibre networks to competitive service providers. The details on how this is to be done are still being worked out.

At this point, it is worth noting four points:

- The ruling will only apply to incumbent carriers. It will not apply to smaller carriers such as the OICRD's fibre network in Olds or, in all likelihood, to Axia Connect.
- The wholesale services made available by the incumbents may not provide bit rates over and above those which the incumbents themselves provide on a retail basis.
- In 'opening' up the access network, the CRTC 'closed' wholesale access to the middle mile or distribution portions of the incumbent networks. In other words a competitive carrier wishing to utilize access fibre on a wholesale basis will need to arrange connectivity to everyone of the incumbent's local/central offices to which their client base connects.
- The incumbents may take the view that as they will be forced to share their fibre access facilities, they can no longer afford to deploy fibre access in smaller centres. Given the operational cost savings fibre provides, however, such rhetoric is just that. Fibre will be deployed regardless.[25]

4.6.1.3   Basic Service Hearings

On April 9th, 2015, the CRTC issued a Telecom Notice indicating that it was undertaking a review of basic telecommunication services to address, in essence, the question of whether or not Internet

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[23] http://www.crtc.gc.ca/eng/archive/2013/2013-551.htm

[24] CRTC; Telecom Regulatory Policy CRTC 2015-326: Review of wholesales wireline services and associated policies; 2015-07-22.

[25] Geist, M.; Ignore the Scare Tactics: The Real Future of Bell Investment in Fibre Networks; Michael Geist Blog; 2016-06-22.

services of some flavour should be regarded as basic, and therefore subject to universal service provisions.[26] The process was to proceed in two phases:

- *"In phase 1, the Commission will review its policies regarding basic telecommunications services in Canada. The Commission will also gather information from the industry to better understand which telecommunications services are being offered across Canada and whether any areas in Canada are underserved or unserved."*

- *"In phase 2, the Commission will ask Canadians to provide their opinions on the telecommunications services they consider necessary to participate meaningfully in the digital economy today and in the future. Specific details regarding the scope and procedure for this phase of the proceeding will be released at a later date."*

Phase 2 was followed by a set of public hearings which completed in April, 2016. No date has been set for the ruling.

4.6.1.4   Enhanced 911

On March 29th, 2016, the CRTC issued a Telecom Notice of Consultation regarding the Establishment of a Regulatory Framework for Next Generation 9-1-1 in Canada.[27] Given the evolving nature of telecommunications and proliferation of smart phones and other connected devices, the *hearing looks to take into account the evolving public safety needs of Canadians. NG9-1-1 will provide Canadians with access to new and innovative 9-1-1 services and capabilities.*

4.6.2   Electrical Regulation

4.6.2.1   Smart Grid

The electric grid is a network of generators, transmission lines, substations, transformers and distribution wires that deliver electricity from power generation plants to homes and businesses. In Alberta, these activities have been deregulated into the four areas of generation, transmission, distribution, and retail as shown in the next figure. Regulatory oversight is variously provided by the Alberta Electric System Operator (AESO) and the Alberta Utilities Commission (AUC). With availability of fibre, the power grid can be upgraded and become 'smart'.

Quoting from Lobo's 2015 report on Hamilton County[28]: *What makes a grid "smart" is the digital technology that allows for two-way communication between the utility and its customers. Like the Internet, the Smart Grid consists of controls, computers, automation, and new technologies and equipment working together. In particular, these technologies work with the electric grid to respond digitally to quickly changing electric demand.*

A smart grid permits a cleaner and more resilient and efficient electrical system. As pointed out in Lobo et al (2011) the Smart Grid plays an important role in mitigating electrical system emergencies, avoiding blackouts and increasing system reliability, reducing dependency on expensive imports, providing relief

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[26] CRTC; Telecom Notice of Consultation CRTC 2015-134: Review of basic telecommunications services; 2015-05-11.

[27] CTRC; Telecom Notice of Consultation CRTC 2016-116: Establishment of a regulatory framework for next-generation 9-1-1 in Canada; 2016-03-29

[28] Lobo, B.J.; The realized value of fibre infrastructure in Hamilton County, Tennessee; Dept. of Finance, The University of Tennessee at Chattanooga; 2015-06-18.

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to the power grid and generation plants, avoiding high investments in generation, transmission and distribution networks and thereby leading to environmental protection.

GENERATION	TRANSMISSION	DISTRIBUTION	RETAIL
Produce power	High voltage long haul distribution	Low voltage local distribution	Sell to and invoice consumers
Private, controlled by AESO	Regulated by AUC & AESO	Regulated by AUC	Regulated (AUC) & Competitive
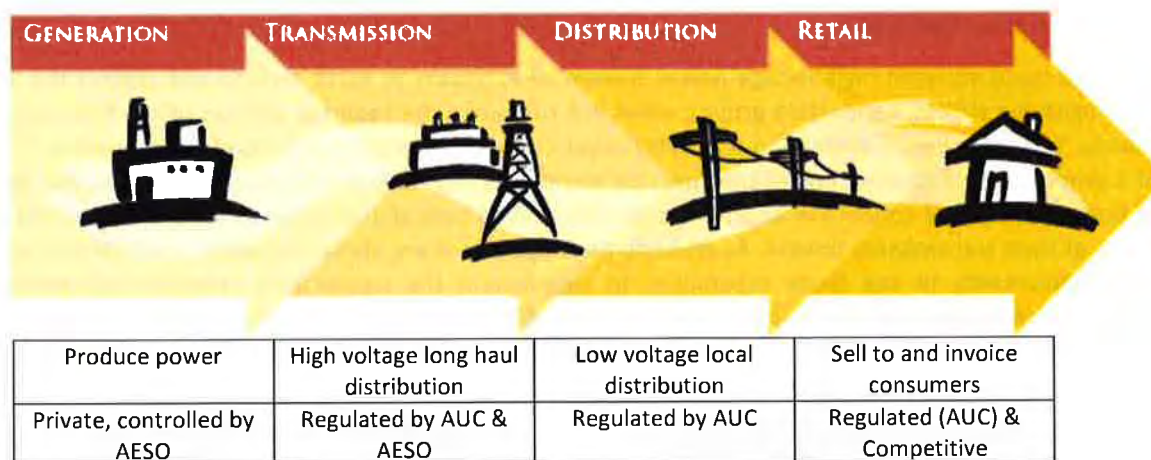
As a result of these benefits, justification for upgrading to fibre infrastructure is often provided by noting and accounting for the benefits of the smart grid, and power companies often become key partners in the deployment of municipal fibre systems. Unfortunately, due to the deregulated nature of the power supply chain and the wholesale pricing policies for power in Alberta, investment in smart grid initiatives within the province have been minimal. Worse, due to industry uncertainty resulting from the Alberta government's green energy initiative to see 30% of the provinces energy grid go green by 2030, current investment in the provincial power infrastructure has been substantially curtailed. There remains the opportunity, therefore, to position smart grid initiatives as a component of the provincial green power strategy and leverage them to further enable fibre deployment throughout the province.

4.6.2.2   LED Lighting

Fortis Alberta operates as an electricity distribution utility within the province and serves more than half a million homes and businesses in 200 communities across Alberta.

As of January, 2016, Fortis changed its street lighting standards to light-emitting-diode (LED) based units. Not only does LED street lighting reduce power costs by ~50%, but being electronic, the new lighting comes with a Wi-Fi option and the potential to both transition to adaptive street lighting and enable community-wide Wi-Fi throughout the province. Given the small incremental cost of Wi-Fi enabled units relative to both the costs of the LED light and the retrofit or installation costs, Wi-Fi units could be provided with every, say, ten streetlamps that are retrofitted at a very low marginal cost. While groups of Wi-Fi units can connect to each other wirelessly, one in every ten or so would need to be directly wired to the Internet.

At this point, Fortis will work with communities to install Wi-Fi units and provide conduit to connect every ten or so to the Internet, at the community's expense, after the LED upgrades have been completed – thus negating the savings that could be associated with installing the units when the lamps are retrofitted. From their perspective:

- With their current practice of deploying a lighting sensor with each lamp, there is little to no advantage in enabling adaptive lighting.
- As Fortis electrical operations are tightly regulated by the AUC, Fortis could not provide Wi-Fi services itself unless a separate non-regulated division or subsidiary were to be established to 'house' the operation and isolate it from their regulated operations.

- Their LED retrofit agreements with contractors are so cost efficient, that complicating them with a Wi-Fi installation step would increase their costs significantly.

4.6.2.3   A New SuperNet

To bond adjacent high voltage power transmission towers to earth ground and protect the lines from lightning strikes, conductive ground wires are run along the topmost portion of the transmission towers. To enable data transfer and telemetry required to help protect and control their facilities, in lieu of a simple grounding wire, power transmission companies routinely install composite cables consisting of both the required conductive and fibre optic lines called optical ground wires (OPGW) along the top struts of their transmission towers. As multiple fibre optic lines are contained within each OPGW, there is an opportunity to use these capabilities to supplement the connectivity requirements between communities adjacent to the transmission lines. As with deploying Wi-Fi units with LED lighting, both operational and regulatory hurdles will need to be worked though if access to these fibre capabilities are to be made available to communities.
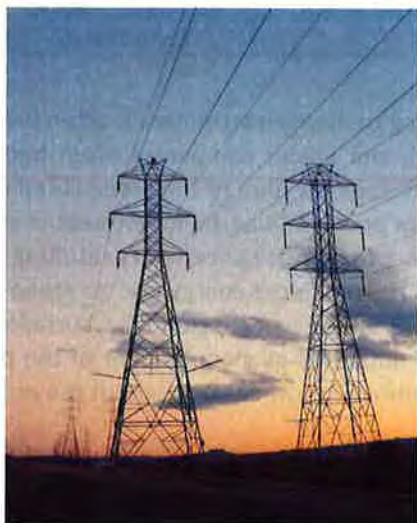
The significance of this possibility lies in the fact that transmission facilities now provide electricity to every municipality in Alberta. Through a network of transmission lines, substations, and OPGWs, there is the potential to create a new fibre backhaul system to connect all municipalities utilizing underutilized fibre assets that are already in place across Alberta.

4.7 Environmental

Climate change has finally made it to the global agenda and CO_2 reduction has become a key focus of governments everywhere. Though ICT-related equipment can be regarded as power-hungry, the use of ICT has the potential to reduce ten times more CO_2 than it consumes.[29] In line with Alberta's Climate Leadership report, ICT offers a way of *'separating economic growth from energy use'*.[30]

Impact areas include:

- Smart Public & Private Transportation and Traffic Management
- Connected, Lower Emission Buildings

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[29] Gartner Group, April 2007; "Saving the Climate at the Speed of Light," WWF and ETNO, 2007.

[30] Leach, A., et al; Climate Leadership – Report to Minister; Alberta Government; 2015.

- Green Urban Planning
- Smart Work Centers
- Cleaner, More Efficient Power Generation
- Smart Grid
- Teleworking
- Green Information Technology

ICT's Impact on CO_2 Reduction is 10x's More It Consumes

TODAY	**Direct Result of Electricity Consumption (Increases CO_2)**	• Energy consumption • Greenhouse gas emissions • Use of non-renewable resources • E-waste & hazardous material	
NEXT	**Impact of Applications (Lowers CO_2)**	• E-government, e-business • Transportation optimization • Energy optimization • Building optimization	
FUTURE	**Long-Term, Socio-economic Changes (Lowers CO_2)**	• Work/ life patterns • Social inclusion, education & health • Economic development • Urban design & development	

ICT's Direct Impact in CO_2 = + 4.73M tons
Possible CO_2 Replacement = − 48.37M tons

When combined with developments from the Internet of Everything, the potential benefits expand.[31]

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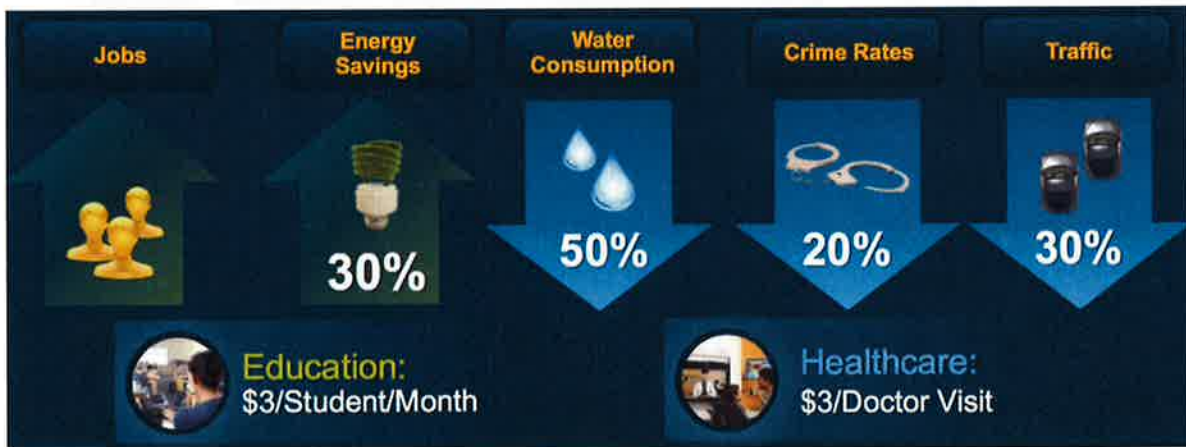
[31] Elfrink, W.; The Internet of Everything – Connecting the Unconnected; Meeting of the Minds; 2013-09-11.

5 Trends

5.1 Technology

5.1.1 The Age of Information Technology and Telecommunications So Far

Prior to looking forward, a brief overview of the progress of the digital revolution and its impacts to date is captured in the figure from the McKinsey Institute on the next page. From mainframes to smartphones and from FORTRAN to machine-learning, progress to date has already impacted up to 98% of the (US) economy.[14]

5% ICT as a share of GDP, as measured in official statistics

10% ICT as a share of GDP, taking into account price effects[1]

Up to **98%** Based on various metrics for measuring digitization in the economy

Successive waves of innovation have shaped the digital economy

1960s	'70s	'80s	'90s	2000s	'10s

- Mainframes and databases
- Desktop and personal computing
- Business software
- Internet and e-commerce
- Mobile broadband
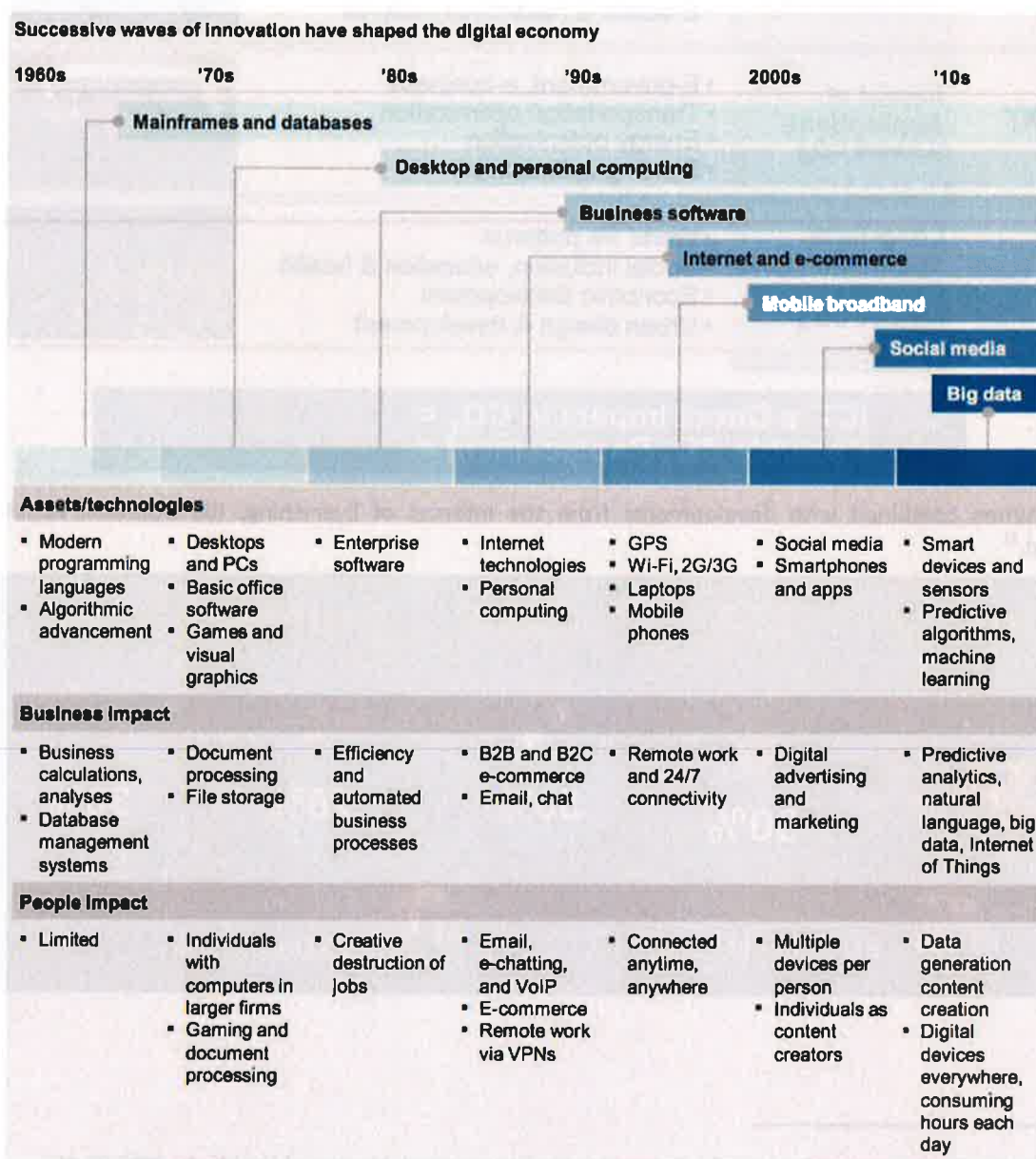- Social media
- Big data

Assets/technologies

• Modern programming languages • Algorithmic advancement	• Desktops and PCs • Basic office software • Games and visual graphics	• Enterprise software	• Internet technologies • Personal computing	• GPS • Wi-Fi, 2G/3G • Laptops • Mobile phones	• Social media • Smartphones and apps	• Smart devices and sensors • Predictive algorithms, machine learning

Business impact

• Business calculations, analyses • Database management systems	• Document processing • File storage	• Efficiency and automated business processes	• B2B and B2C e-commerce • Email, chat	• Remote work and 24/7 connectivity	• Digital advertising and marketing	• Predictive analytics, natural language, big data, Internet of Things

People impact

• Limited	• Individuals with computers in larger firms • Gaming and document processing	• Creative destruction of jobs	• Email, e-chatting, and VoIP • E-commerce • Remote work via VPNs	• Connected anytime, anywhere	• Multiple devices per person • Individuals as content creators	• Data generation content creation • Digital devices everywhere, consuming hours each day

Over time, digital technology has moved from highly centralized, but somewhat remote, mainframes to highly decentralized desktops to a hybrid state in which innumerable capable end devices and sensors jointly interact in real-time with vast centralized and remote cloud computing centres. With this evolution has been an increasing demand for ubiquitous, always-on, higher bandwidth connectivity. Network capacity demands have been doubling 2-3 years now for over two decades.

5.1.2 The ERaCha Era

According to the Strategic News Service, we are now living on the edge of radical change (ERaCha). Indeed, when the set of potentially disruptive technologies and their applications shown in the figure below are considered, one begins to appreciate the true scope of the impending change.[32]
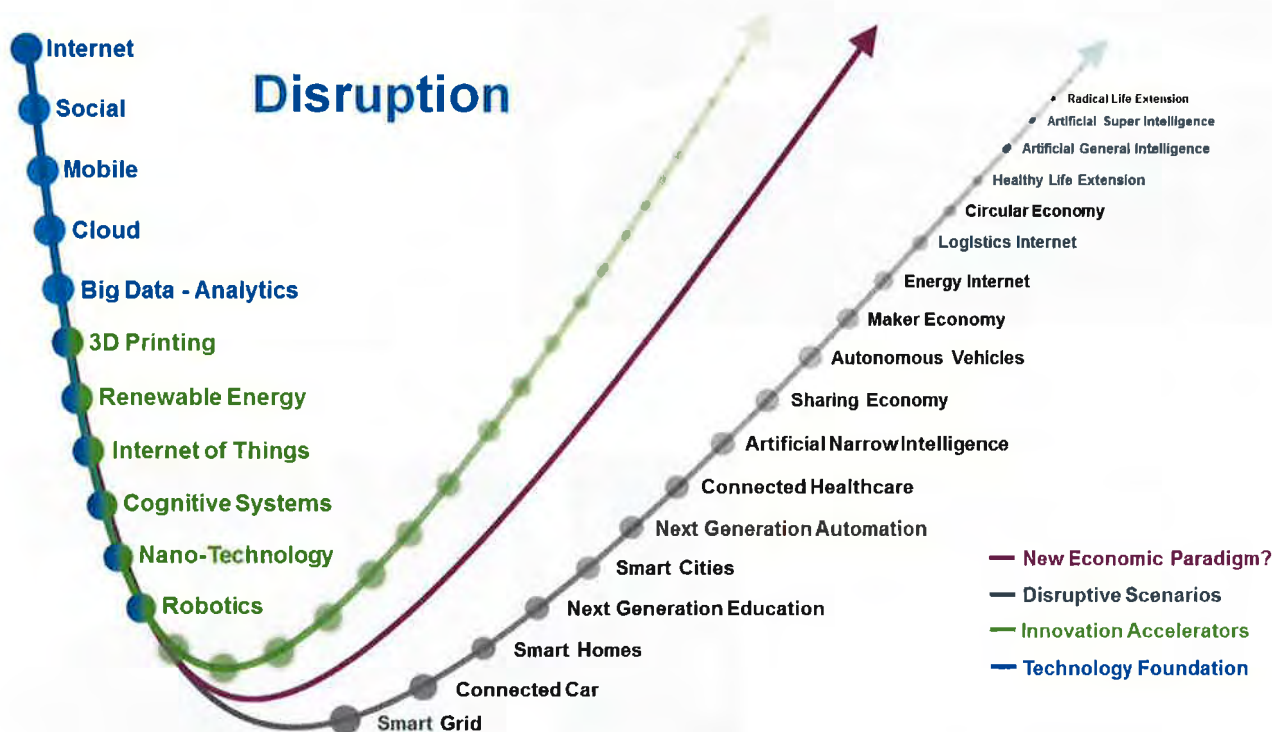
According to Singularity University, the six technology enablers likely to make the biggest impact over the next decade are:[33]

- 3D Printing – Additive Manufacturing
- Networks and Sensors – The Internet of Everything
- Infinite Computing
- Artificial Intelligence
- Robotics
- Synthetic Biology

Each is an exponentially driven digital-based technology with the potential, both individually and synergistically with others on the list, to truly disrupt the status quo across many sectors. With true

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[32] Dianna, F.; The Maker Economy; Frank Dianna's Blog; 14 11 10.

[33] Diamandis, P., and Kotler, S; Bold: How to go Big, Create Wealth, and Impact the World; Simon & Schuster; 2015.

broadband networks, these disruptions may be orchestrated from anywhere – that is, anywhere where the network capabilities exist.

Together with 3D printing, for example, ICT and the knowledge economy are rendering the traditional Daimler-Chrysler model for automotive manufacturing obsolete and opening up the very real possibility of a competitive manufacturing facility in, say, the Town of Granum (their former Mayor was quite interested in the possibilities that 3D manufacturing offered). The potential has spawned the so-called 'maker' movement, examples of which exist in Calgary and are developing towns such as Pincher Creek.

The poster child for 3D printing might be Local Motors. In a manner analogous to the open-sourced software model in which a large group of disparate individuals with a common interest collaborate to produce great work like Linux and Apache, Local Motors[34] has created an open-sourced

platform linking 30,000 individuals with an interest in designing and building things that move – cars, bikes, trucks, and so on. Their platform is called *'The Forge'* and several years ago, a group of individual widely dispersed car enthusiasts used it to design the first community designed vehicle – The Rally Fighter – an off-road, street ready powerhouse. They then designed a combat vehicle for DARPA and were introduced to President Obama. Development time was five times faster and one hundred times less expensive than traditional defence development cycles. In

both cases, the resulting vehicles were then manufactured in a micro-factory – the first of which was constructed in a refurbished 40,000 square foot building in Chandler, AZ for US$300,000. The development economics are such that Local Motors breaks-even on production runs of less than 200 vehicles.

Recent developments in additive manufacturing are now even rendering the 40,000 square foot factory redundant – indeed, a home garage with a broadband connection to download design files will

suffice. On Sept. 14th, 2014 at the International Manufacturing Technology Show in Chicago, Local Motors 3D-printed a functional vehicle, the 'Strati' in front of a live audience. Once printed, their CEO, Jay Rodgers, took it for a spin. Change the files, and you end up with a boat, or farm implements, or, whatever.

Turning to the second item on the list, consider the Internet of Everything (IoE). According to the Cisco Visual Networking Forecast, the number of networked devices in Canada will increase from 167 to

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[34] http://www.localmotors.com/

313 million over the 2013 to 2018 period.[35] The 313 million device estimate above translates to over eight networked devices per person in Canada and partially results from the proliferation of sensors and the linking of the Internet to the physical environment for purposes of monitoring, automation, and intelligence. Together these trends are leading to the development of the so-called Internet of Things or the Internet of Everything.[36]

Servers and storage
PCs and tablets
Smartphones
Switches and routers
PBXs

HVAC, transport
Fire and safety
Lighting, security, access

Tanks, fighter jets
Cars, jeeps, ambulances

Turbines and windmills
UPS, batteries, generators, and fuel cells
Meters, drills

Homeland security, fire
Environmental monitoring
Battlefield communications

Commercial/institutional
Industrial

Public
Enterprise

Public infrastructure
Emergency services
Surveillance
Equipment
Tracking

Supply and demand
Oil and gas
Alternative energy

Buildings

IT and networks

Energy

Security/ public safety

Digital cameras, power systems, dishwashers
E-readers and desktops
Washers/dryers
Lights, TVs
MP3s, gaming consoles
Alarms

Infrastructure
Convenience
Entertainment
Awareness
Safety

Consumer and home

The Internet of Things

Retail

Specialty
Hospitality
Stores

POS terminals
Tags
Cash registers
Vending machines
Signs

Health care and life sciences

Transportation

Industrial

Care
In vivo/home
Research

Transport systems
Non-vehicular
Vehicles

MRIs, PDAs
Telemedicine
Surgical equipment
Monitors
Implants

Distribution
Resource automation
Converting/discrete
Fluid/processes

Vehicles, lights, ships
Planes, signage
Tolls

Pumps, valves, conveyors, pipeliners
Motors, fabrication
Assembly/packaging, vessels/tanks

■ Industries and sectors   ■ Application groups   ■ Devices

The IoE not only enables disruption in the Smart Grid, Smart Home, and Smart Cities areas, but also in enabling the connected car, next generation automation, and connected healthcare, including personalized medicine and the quantified self. Further out, it will enable the energy and logistics Internet, and with contributions from artificial intelligence (AI), autonomous vehicles.

According to Cisco, some 50 billion smart objects will be connected globally by 2020 and enable everything from smart power, transportation, water, and so on. Of these, 601 M will be personal wearable devices, for which the compound annual growth rate (CAGR) is expected to be 44%.[37]

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[35] Cisco; Cisco Visual Networking Index: Forecast and Methodology, 2013-2017; Cisco; 2014

[36] Gartner Group poster: The Intelligent City of the Future.

[37] Cisco; The Zettabyte Era: Trends and Analysis; Cisco; 2015.

Picture courtesy of Credit Suisse

The distribution of the remainder, together with the expected growth-rate over the 2014-2019 period, by sector appears in the graph. The largest category will be the connected home, followed by enterprise management systems in the work environment, utilities, and the connected car. Wearables fall under Connected Health.
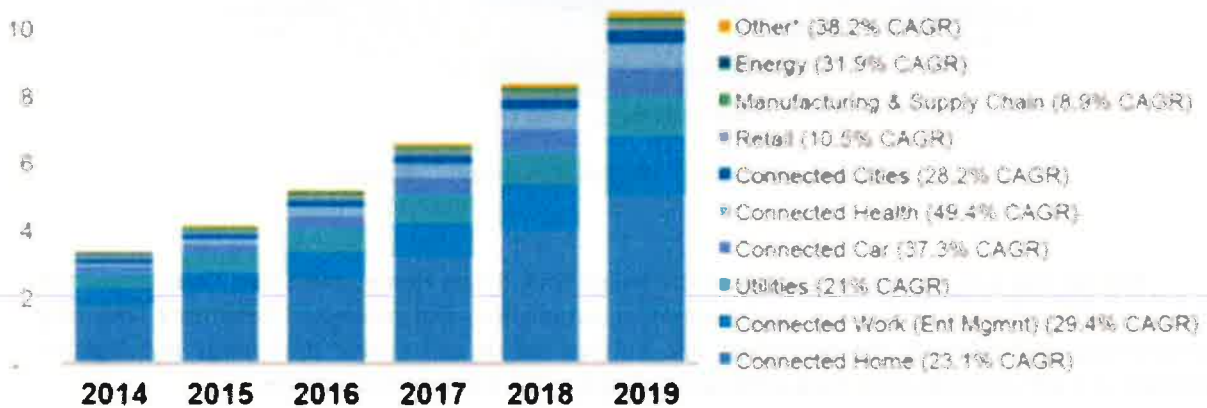

Global machine-to-machine (M2M) connection counts, billions. [36]

Current late model cars contain over 400 sensors that generate 20+ GB of data/hr. Each of the 5000 jet engines leased out by GE contain some 250 sensors that monitor every aspect of each engine's operation in real time. Current generation smart phones contain pressure sensitive touch-screens,

microphones, accelerometers, magnetometers, gyros, and cameras. Globally, the network value of the IoE is estimated to hit CDN$15.6 trillion by 2022.[38]

The City of Calgary has embraced the connected city idea and is currently deploying traffic controllers and road cameras.
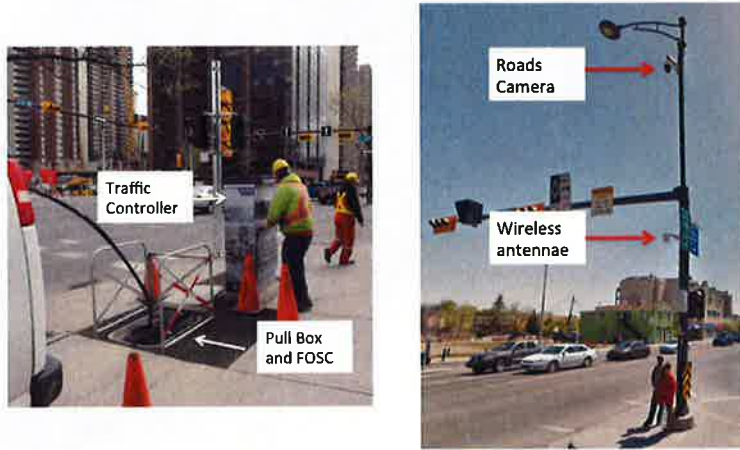
Photos Courtesy of David Basto

To realize the benefits of the connectedness the IoE offers, large amounts of data must be collected over time and analyzed. As particular applications typically require data from multiple sources, open data initiatives are needed to ensure the data generated by multiple sets of sensors are all available to the analytics software employed to examine the data and produce useable results. St. Albert has also been active in this space and already has a few applications up and running.[39] The Calgary Region recently created an open data site focused on municipally-generated data.

On the home front, the possibilities are only limited by one's imagination – as exemplified below by the artists concept of a future kitchen.

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[38] Elfrink, W.; The Internet of Everything – Connecting the Unconnected; Cisco; 2013-09-11.

[39] Heron, C.; Planning for a 'Smart' Future – St. Albert's Approach; Smart City Alliance Symposium; 2016-04-13.

Picture courtesy of Wareables

Infinite computing is becoming available via the 'Cloud'. Cloud computing is the delivery of computing resources as a service, whereby processing power, software, storage, information, and related services are provided over a network by a third party utility service provider similar to the way in which power is delivered over the electrical grid.[40]

In this real and quickly evolving context, it is not surprising that annual Internet and mobile traffic is growing at compound annual rates of 21% and 69% respectively. The message here is that the rate of growth in what will be needed for digital connectivity even five or ten years from to day is going to be orders of magnitude greater than what we have experienced to date. That level of connectivity and capacity requires a fibre-based infrastructure whether constructed on a private, public/private partnership, or on a public fibre utility basis. Either way, the existing copper/coaxial cable infrastructure is about to be replaced and, depending on how that takes place, broader public benefits may be widely achieved or more limited as a result.

5.1.3 Network Connectivity

A visual comparison amongst the capabilities of the four major transmission technologies – wireless (tan), copper (tan), coaxial cable (yellow), and fibre (red) appears below. In the figure, unless otherwise specified, the numbers shown are in Mb/s.

New fixed wireless LTE systems will do up to 100 Mb/s per antenna. This bandwidth is split amongst downstream (from the network to the client, like a Netflix stream) and upstream (from the client to the network, say for uploading photos or backing up data to the cloud) link requirements as needed and would typically be split into something like 75 Mb/s down and 25 Mb/s up. As the available bandwidth is then shared amongst all the homes taking service within the coverage area, if 50 homes took service and happened to be streaming media content concurrently, the maximum available to each would be 1.5 down by 0.5 Mb/s up.

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[40] http://en.wikipedia.org/wiki/Cloud_computing
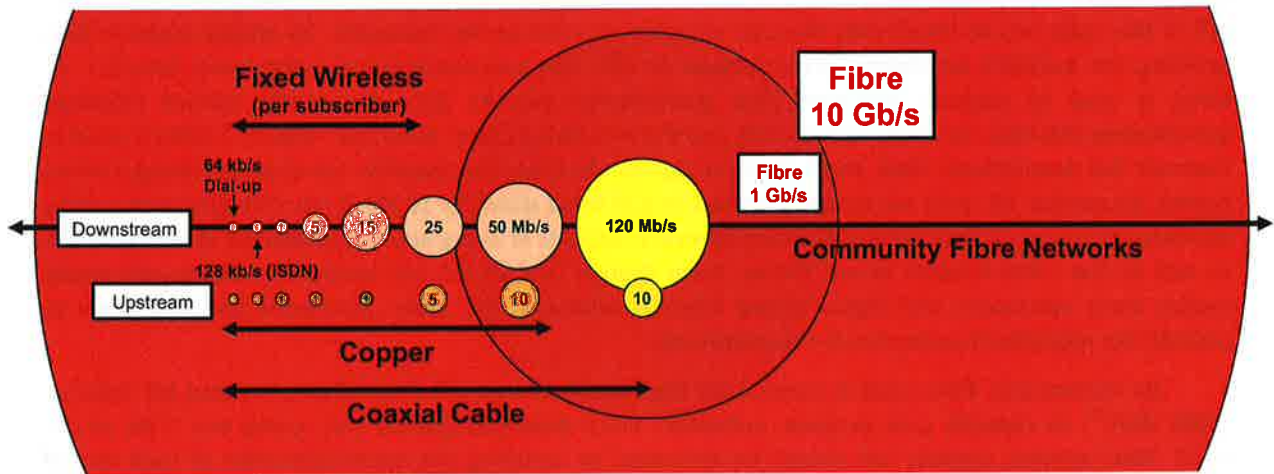
Internet data services over the copper plant deployed by the telecommunication incumbents are provided via an evolving family of digital subscriber line (DSL) technologies. Due to the attenuation of higher frequencies required to support broader bandwidth signals, the higher the supported bit rates, the shorter the possible serving distance between the incumbent equipment and the client's home or office. As shown in the Ofcomm chart below, DSL technologies have evolved over the years, but with the increasing speeds, come shorter serving distances – so each upgrade requires the incumbents to deploy fibre deeper into the access network – i.e., closer to the end client before transitioning to copper. Whereas initial asymmetric DSL (ADSL) equipment offering 6 to 8 Mb/s down and 0.512 Mb/s up could be served from central offices within 4 km of the client, more recent very high bit-rate DSL (VDSL) supporting 13-52 Mb/s down by 1.5-2.3 Mb/s up requires fibre to the neighbourhood. VDSL2 supporting symmetric 100 Mb/s services requires fibre-to-the-block.
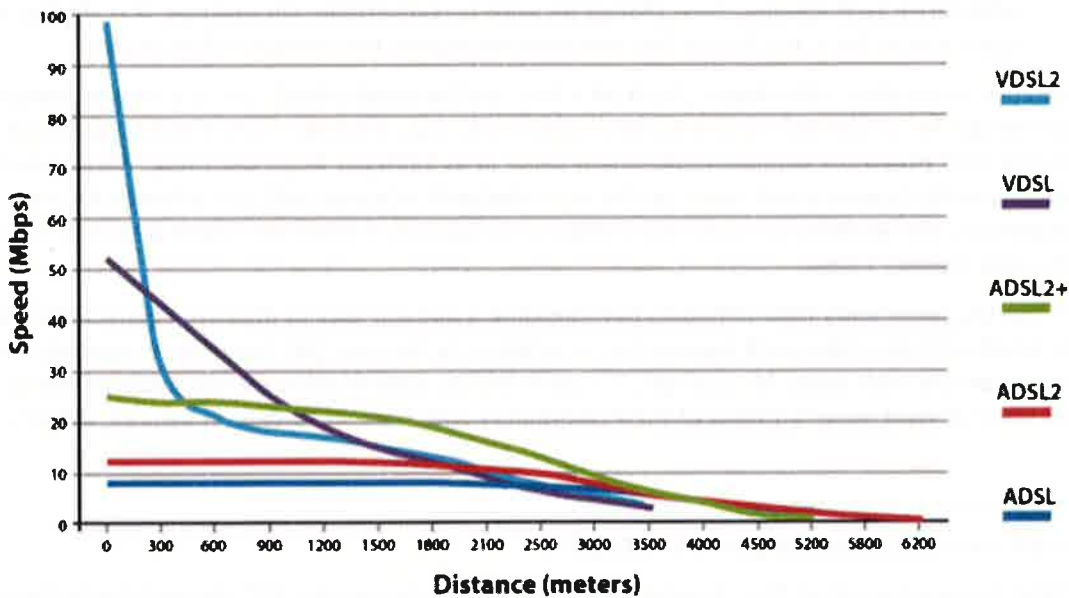
In urban centres, lengths are typically short enough to support 50 Mb/s down by 10 Mb/s up. With longer drops in the rural areas, the higher bandwidth services are simply not supported.

As the coaxial cable plant deployed by the cable operators can support bandwidths exceeding 1 GHz, to keep things simple, all available cable television signals are transmitted to every home – it's then left to the cable box to direct only the user selected channel to the television. To enable Internet data services, the available bandwidth is partitioned or split into two components – the lower one (5 – 42 MHz) is used to support upstream data transmission via the data over cable service interface specification (DOCSIS, currently version 3.0) and the remaining upper band (50 – 860 or 1 GHz) is used to transmit the downstream data and television signals. As these bandwidths are shared amongst many homes, subscriber bit rates are typically limited to 120 Mb/s down by 10 Mb/s up. Changing that split to increase upstream bit rates requires changing every diplexer in every active component in the network, as well as the cable modem boxes. Hence, even though DOCSIS 3.1 has become available and would enable more symmetric and higher speed Internet offerings, the cable companies are only likely to provide the upgrades in exceptional circumstances.

By comparison, fibre used in community fibre deployments will theoretically support bit rates up 2,800 Gb/s[41], its capacity is in essence, unlimited. Once deployed (buried civil works are ~70% of the cost), fibre network capacity can simply be increased by updating the opto-electronics at each end of the cables as needed. Currently deployed opto-electronics provides for symmetric 1 Gb/s services to each premise or 2.5 Mb/s down by 1.5 Mb/s up shared amongst up to 64 premises. The new XG-PON technologies enable up to 10 x 2.4 Gb/s links shared amongst up to 128 homes. To provide more bandwidth per premise, lower split ratios can be used (e.g., 1:2, 1:4, 1:8, 1:16, or 1:32).

According to the Fiber to the Home Council:[42]

> So much data zips around the world today in commerce, education, entertainment and personal communication that copper wires and radio waves could carry only a fraction of it. Because fiber optic cable has so much capacity, it now forms the backbone of the Internet, cable TV networks, telephone (including cellular) networks, private business networks and even data center networks. Without fiber optic cable, none of these systems would work.

> FTTH offers far more bandwidth, reliability, flexibility, security and longer economic life than alternative technologies, even though its price is comparable. On average, it is slightly more expensive to build, but it is far less expensive to operate and maintain than copper.

Relative to wireless technologies, both on a cost and bandwidth basis, there is no comparison. In a sample design for a 200 mi^2 rural area in Chamberlain, S.D., Vantage Point Consulting found that whereas the least expensive wireless deployment came in at $370 per Mb/s per client, fibre came in at $9 – and fibre scales (capacity and reach can be expanded with minimal cost), but wireless does not.[43] In this comparison, the wireless network was designed to support 4 Mb/s per client whereas the fibre network could support 1 Gb/s.

In the US, community fibre networks have become a popular way to improve connectivity – even in states which actively inhibit such approaches. In addition to the over 200 community networks shown in the figure on the next page, for example, 77 communities have publicly-owned cable networks and over 185 serve at least some portions of their community with fibre.[44] To date in Canada, there is only
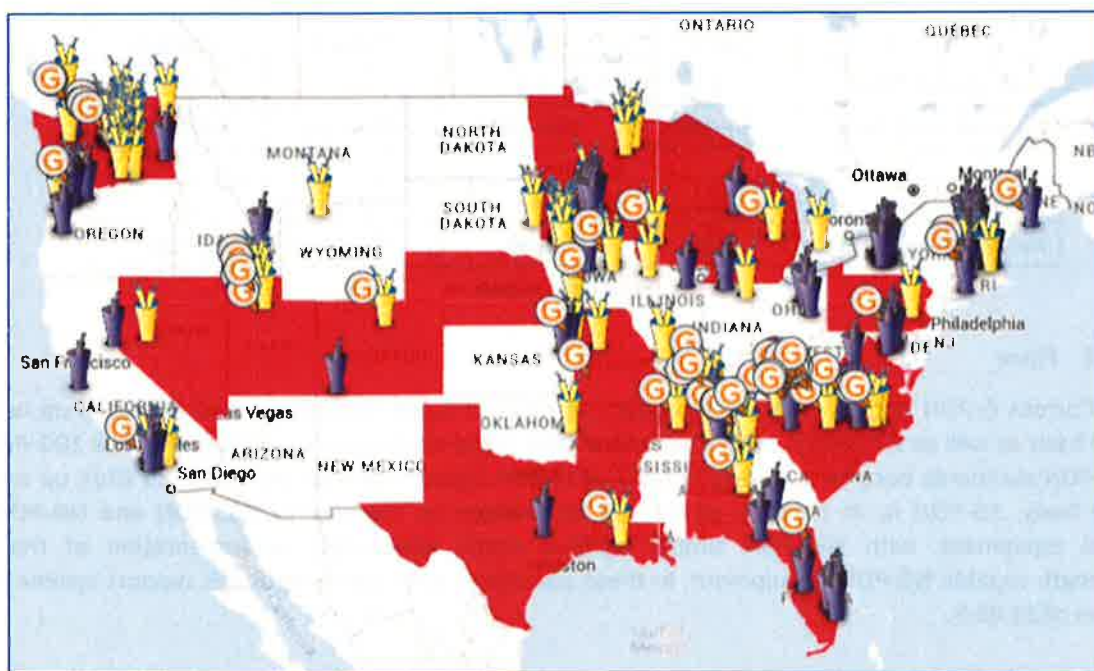
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[41] Bandwidth estimate assumes 256 QAM at λ =1.55 μm

[42] Broadband Communities; What Fiber Broadband Can Do For Your Community; 10th Edition; Fibre to the Home Council; Americas Fall, 2014

[43] Thompson, L., et al; Comparing Wired and Wireless Broadband; Broadband Communities; 2015 05/06.

[44] https://muninetworks.org/communitymap

one community-owned FTTP network offering 1 Gb/s services (Olds) and may be 5 with dark fibre. Furthermore, some 25 of the 48 US states reporting have established a broadband office – in Canada, none have.

🏺	83 Communities with a publicly owned FTTH network reaching most or all of the community.	Ⓖ	Over 50 communities in 19 states with a publicly owned network offering at least 1 Gb/s services
🏺	Over 115 communities with publicly owned dark fibre available	🟥	Nineteen states have barriers in place that discourage or prevent local communities from deciding locally if such an investment is a wise decision.

5.1.4   Recent Advances in Traditional Technologies

5.1.4.1   Copper – Fast DSL

The evolution of DSL technologies continues. VDSL2 speeds are increasing with the introduction of 'vectoring', a scheme which helps minimize interference effects from signals in adjacent copper pairs. As well, G.fast (G.970x fast access to subscriber terminals) compliant equipment became available earlier this year. G.fast equipment supports bit rates symmetric 100 Mb/s bit rates on links up to 200m.

5.1.4.2   Coax – DOCSIS 3.0 and 3.1

The evolving DOCSIS specifications are summarized in the table below.[45] As mentioned earlier, the North American 42 MHz subsplit affects almost every component in cable system distribution networks, making upgrades beyond current implementations expensive. On a relative basis, however, as it's 'only' electronics, the required upgrades are much less expensive than those involving the deployment of additional access (fibre) infrastructure. Note that as cable is a shared infrastructure, the aggregate bit

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[45] Zhao, R., et al; White Paper: Broadband Access Technologies; FTTHC Europe; 2013.

rates appearing in the table are shared amongst however many client premises that segment of the distribution/access plant connects to.

	DOCSIS 3.0		DOCSIS 3.1	
	Current	Phase 1	Phase 2	Phase 3
Downstream: Gb/s	0.3	1.0	5.0	10.0
Assigned Band: MHz	54–1002	108–1002	300*–1152	500*–1700

	Current	Phase 1	Phase 2	Phase 3
Upstream: Gb/s	0.1	0.3	1.0	2.0*
Assigned Band: MHz	5–42	5–85	5–230*	5–400*

* to be determined

5.1.4.3 Fibre

Current G-PON optical electronics support bit rates of 2.488 Gb/s down by 1.244 Gb/s up on a shared basis as well as symmetric 1 Gb/s dedicated links. Opto-electronics supporting the new 10G-PON or XG-PON standards became available in early 2016 and support 10 Gb/s down by 2.5 Gb/s up on a shared basis. XG-PON is, in essence, an interim technology on the way to XGS-PON and NG-PON2 capable equipment, with XGS-PON simply being a single wavelength implementation of the 4 wavelength capable NG-PON2 equipment. In these standards, each wavelength will support symmetric bit rates of 10 Gb/s.

5.1.5 Exotic Technologies

5.1.5.1 Micro-satellites

Over the years, there have been a number of initiatives focused on deploying a constellation of low earth orbit satellites (LEOS) capable of providing Internet services with global coverage. While the initial Motorola Iridium program did partially succeed, the later Teledesic and Skybridge efforts did not. As technology has evolved, smaller, higher capacity satellites have become possible and costs have decreased significantly. The two current incarnations, OneWeb and SpaceX's, both involve constellations of hundreds of micro-satellites. Both are still in concept their phase and the satellites have not yet been designed. At this point, one is banking on 640 or 700 satellites, while the other is suggesting 4,000. The former is already behind schedule and the latter will require a breakthrough in launch technology.

5.1.5.2 Starry

A particularly interesting, well funded startup in Boston, called Starry[46], is developing what is in essence a fixed point-to-multipoint wireless system operating at 37–40 GHz, focused on delivering symmetric 1 Gb/s access to homes in urban areas – thereby obviating the initial requirement for FTTP.[47] With a range of 1 km, each central antenna can serve between 600 and 900 premises. Beta testing to Boston area residents began in July.

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[46] https://starry.com

[47] Talbot, D.; Wireless, *Super-Fast Internet Access Is Coming to Your Home*; MIT; 2016-05-16.

5.2 Application Trends

Growth in aggregate backbone data traffic based on US statistics slowed to 21% in 2014, while growth rate of the video streaming component of that increased to 64%. Smart phone subscribership is growing twice as fast as Internet (20% versus 10% annually) and at a CAGR of 52%, tablet shipments are going through the roof. These growth rates together with the growth in mobile video usage are resulting in mobile data traffic increases of nearly 69% per year[48]. As 80% of mobile data is received via Wi-Fi connections to fixed networks (OECD) and 100% of backbone mobile traffic carried over landline networks, the demand for the higher bandwidth connectivity available from fibre is increasing.

Phones for a Six Year-old

| Circa 1965 | Circa 1990 | Circa 2015 |

Internet video traffic is expected to increase at a CAGR of 14% over the 2014 to 2019 period. The high definition (HD) component of this will increase from 55.8% to 69.9% while the Ultra-HD component will increase from 0.2% to 21.0%. On a per household basis, the average Internet user generated traffic will increase 152% – some 20%/yr over the five year period.

As in the early days of single purpose networks, corporate computing departments struggled with arrays of computing hardware, each component of which ran different application sets. As the application sets typically did not tax the capabilities of the underlying hardware, costs were high and efficiency was low. The development of virtualization software made it possible to run each of the application sets on one powerful hardware platform. To each application set, the virtual computing environment on which it ran simply looked like the single purpose platform it was used to. Using this type of software, O-Net runs over a hundred virtual machines on one platform.

As virtualization software matured, it become possible to scale the underlying hardware platforms running virtualization software to encompass very large computer arrays and Cloud

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[48] As of 2014; the video component of the mobile data usage is growing at 55%.

computing was born. Anytime a smartphone user activates one of the more powerful apps on their phone, say Siri, for example, they are directly interacting with a cloud computing environment.


    Cloud computing allows firms to lease storage and processing capacity from others, rather than buying and maintaining their own internal servers and data centres. Clouds can be private, public, or a combination of both. The many benefits of using cloud computing infrastructure appear in the next figure, courtesy of MagTech Solutions. Small and medium-sized firms use clouds to ensure they can scale quickly to meet demand. Larger firms are looking at cloud computing as a way to reduce computing costs. Outsourcing computing services reduces costs, helps keep software up-to-date, and encourages collaboration.
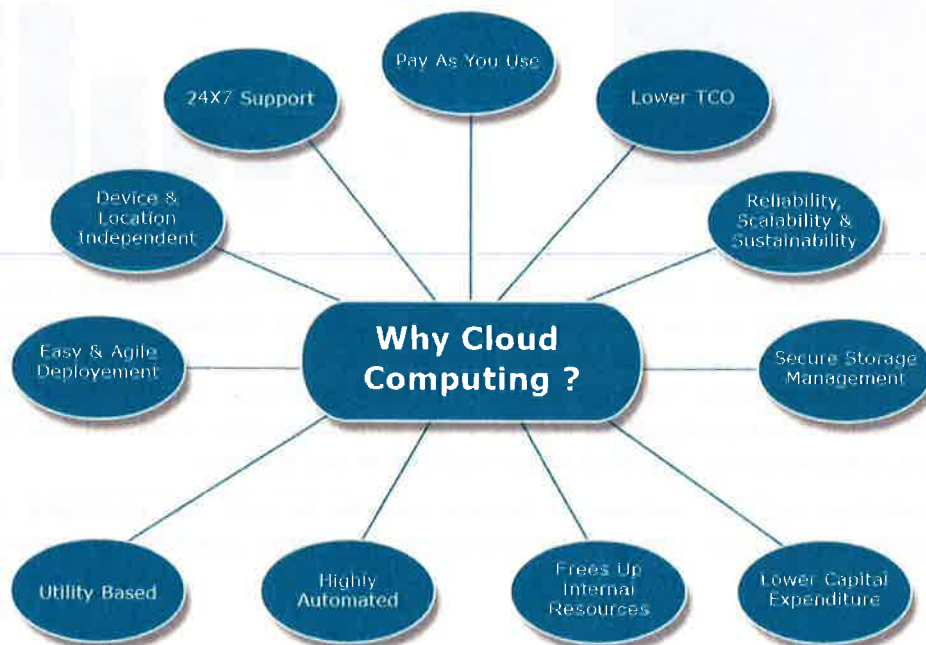
According to one estimate, cost reductions for a medium-sized retail firm consisting of 40 stores and 500 employees run in the range of 47%.[49] IDC estimates that big companies will spend $100 billion on cloud computing services in 2014. As prices come down and security fears are addressed, this number will likely grow significantly. Mark Hurd, CEO of Oracle suggests that, over the next ten years, all corporate computing will be moved to the cloud.

Cloud computing infrastructure is typically configured to run as three layers – infrastructure, platform, and applications.

ANNUAL IT SPENDING OF A MEDIUM-SIZE RETAILER
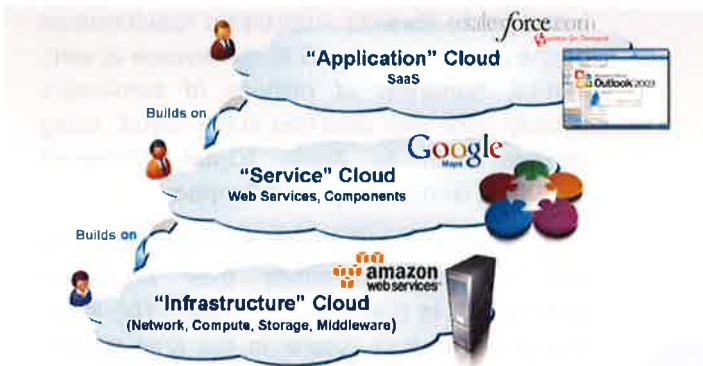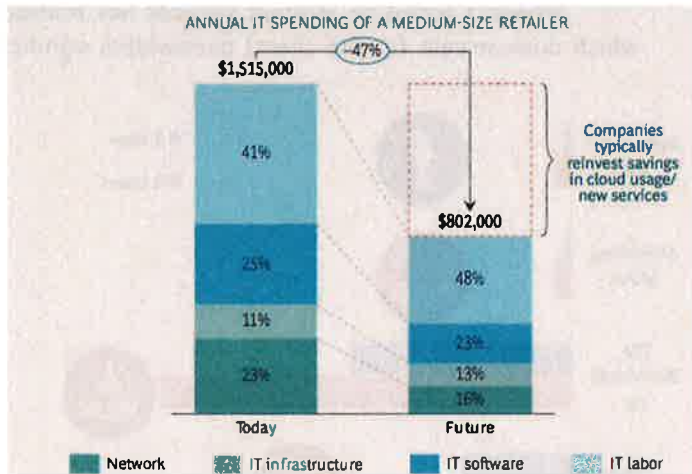
Infrastructure: includes the hardware infrastructure components such as the network optical-electronics and routing infrastructure, and data-centre computing infrastructure.

Platform: a common integrated set of software, application programing interfaces (API's), and platforms that ties all underlying infrastructure components together on the one side and presents it to the applications/software layer on the other.
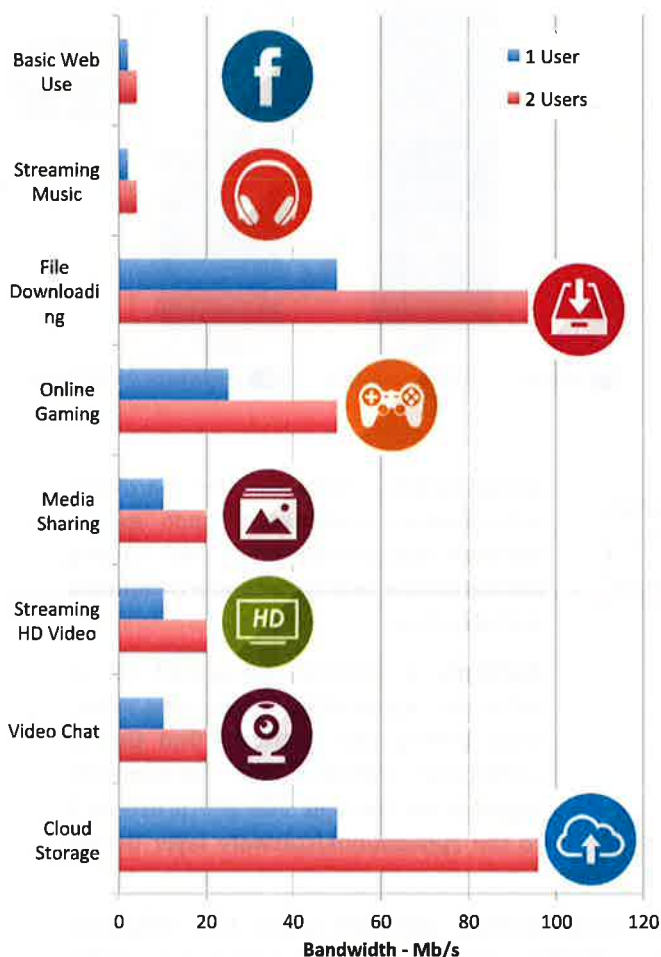
Applications/services (Software): Commercial and crowd-sourced software suites that empower revenue generating, marketable services. Integrated applications currently being investigated are in the areas of eGovernment, eHealth, Digital Education, Smart Homes, and a Town Portal.

When standardized access to the individual components comprising each layer is made available as a service, that capability is denoted as the layer's name followed by 'as a service' (aaS). Hence, the terms IaaS, PaaS and SaaS, or collectively XaaS. Examples of services by layer appear in the adjacent figure.

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[49] Eazor, J.F. & Gilliland.G.; Can Your Network Deliver the Potential of the Cloud; BCG Perspectives; 2016-02.

Taylor Warwick Consulting Limited   *2016 08 14*   32

Whereas access to Internet services has traditionally been provided on an asymmetric basis in which downstream (to the client) bandwidths significantly exceeded upstream (from the client) capabilities so as to enable the consumption of content, cloud computing requires symmetric bandwidth and fibre. Though video streaming services – YouTube and Netflix in particular – typically dominate both overall and aggregate down-stream bandwidth requirements, business services, partly due to cloud requirements, dominate upstream requirements. These results are supported by the strong response from local business in Olds to the upstream bandwidth potential offered by O-Net. As business-related services such as remote backup move into the consumer space – say, for example to back up home computer-based photo libraries – upstream requirements on the consumer side will likely increase as well. Indeed, hundreds of millions of consumers already store their data files in the 'cloud', using services such as Apple iCloud, Microsoft OneDrive, Google Drive, and Dropbox.

In summary, the evolution of applications and bandwidth demands over time are summarized in the adjacent chart.[50] The initial always-on services appear in the grey square, current applications in the blue square, and current largely unmet demands for significant bandwidth appear in the red square. Skynet refers to the self-aware artificial intelligence system which features centrally in the Terminator movie franchise and serves as the franchise's main antagonist – perhaps not the best example of where we might want things to go.

5.3 Intelligent Communities / Smart Cities

Established as a nonprofit policy research organization in 1999, the Intelligent Community Forum (ICF) focuses on the economic effects of broadband together with community-based best practices, and invites communities to compete for an annual Intelligent Community Award.

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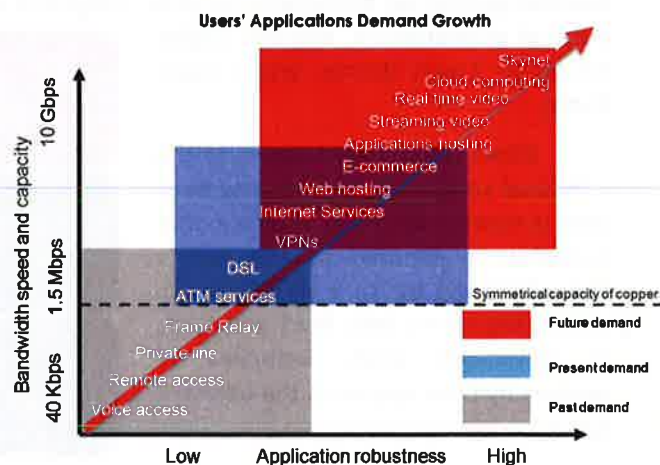
[50] Western Ontario's Wardens Caucus (WOWC); Regional Broadband Feasibility Study; WOWC-02-12; 2013 08 / Taylor Warwick Consulting

Intelligent Communities turn to technology not just to save money or make things work better: they create high-quality employment, increase citizen participation and make themselves great places to live, work, start a business and prosper.[51]
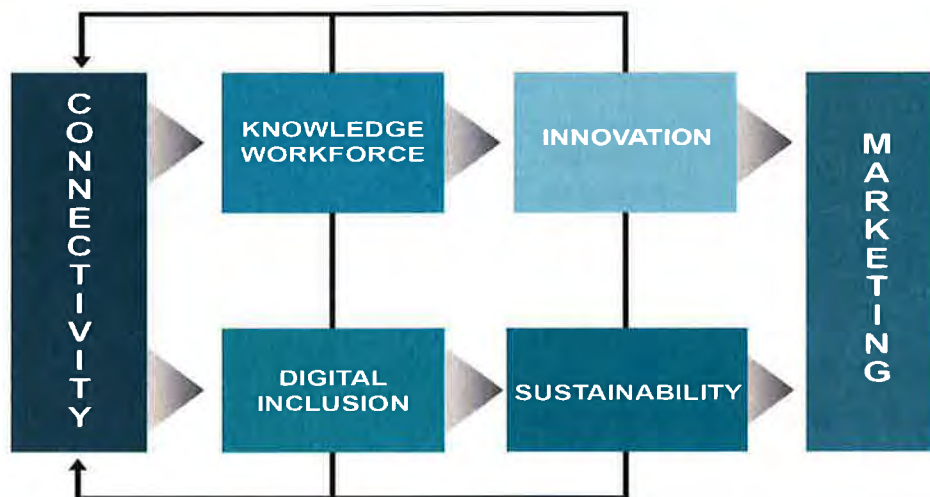
Under the IntelligentYQL banner, Lethbridge initiated their quest to become an Intelligent Community in 2014. Led by a partnership between their internal IT and Economic Development departments, a twenty person community-wide steering committee was established. Using the Integral Strategy Roadmap methodology and extensive community engagement, an elaborate Master Plan was created and details can are available at www.intelligenctYQL.ca. Last October, the ICF recognized Lethbridge as a top 21 ICF community. Lethbridge is now focused on developing integrated connectivity and open data strategies.

Communities of the Year

Whereas the ICF embraces the effects of ICT as an enabling technology to improve the quality of life for a community's citizens, the more recently coined *Smart City* concept is significantly more encompassing, and thus less focused, in scope – both in terms of the underlying enabling technologies and in terms of the impacts sought. Popularized by the original IBM Smarter Cities 2010 Challenge, Wikipedia defines a Smart City as:

A smart city is an urban development vision to integrate multiple ICT solutions in a secure fashion to manage a city's assets – the city's assets include, but not limited to, local departments information systems, schools, libraries, transportation systems, hospitals, power plants, water supply networks, waste management, law enforcement, and other community services. The goal of building a smart city is to improve quality of life by using technology to improve the efficiency of services and meet residents' needs. ICT allows city officials to interact directly with the community and the city infrastructure and to monitor what is happening in the city, how the city is evolving, and how to enable a better quality of life. Through the use of sensors integrated with real-time monitoring systems, data are collected from citizens and objects - then processed and analyzed. The information and knowledge gathered are keys to tackling inefficiency.[52]

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[51] http://www.intelligentcommunity.org

St. Albert initiated a Smart City initiative a few years ago and, with Cisco, hosted a Smart City symposium in September, 2014. They then founded a Smart City Alliance mentioned earlier. There are four parts to their multi-pronged 'Smart' approach:

| **Master Planning** | **Priority Projects** | **Stakeholder Engagement** | **Collaboration & Outreach** |
| *(Charting the Course)* | *(Laying the Foundation)* | *(Ensuring Alignment)* | *(Working with Others)* |

The key Master Plan objectives are:

- Generate opportunities for efficiencies
- Support economic differentiation, attraction and diversification
- Improve asset management and service delivery
- Foster culture of innovation, and testing (a "living lab")
- Use data and analytics to make better decisions

Priority areas are: Economy, Mobility, Governance, Living, People, and the Environment. To date, over 20 strategies and 75 action items have been identified. The draft Master Plan has been completed and was released for comment in May, 2016.

Open data, or the ability for all municipal stakeholders to be able to access and analyze the many data sets created via the underlying connectivity and sensor systems being established to enable a city to be smart is therefore a key enabling technology for the Smart City concept. Open data initiatives are underway in Calgary, Edmonton, Lethbridge, and St. Albert. St. Albert is focused on becoming a Smart City and in 2014 established the Smart City Alliance focused on developing the cross-sector collaboration needed to support Alberta communities in their quests to become 'Smart'. Spruce Grove could become a member of the Smart City Alliance and information is available at: https://smartcityalliance.ca

6   Networks as Utility Infrastructure

6.1 Networks versus Services

As discussed earlier, under the facilities-based competitive structure that exists in Canada, competing broadcast or telecommunication companies must own the networks over which their services are provided. Given today's fibre networks can carry any digital media one can imagine, this is equivalent to requiring that each car (Honda, GM, …) manufacturer own the road system over which their cars travel. Under this regime, the bigger cities would likely end up with multiple systems of roads, while the smaller centres might go without. Long ago, communities realized that by providing one road system for all to use, competition in vehicle production would flourish, and the benefits to the community would be many.

[52] https://en.wikipedia.org/wiki/Smart_city
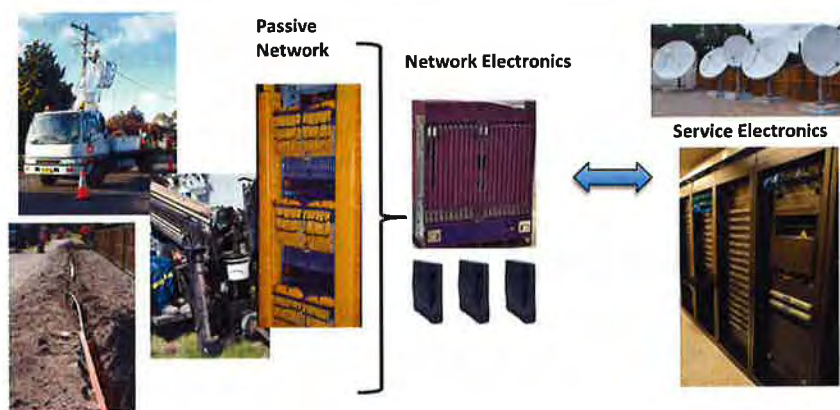
Analogously, many European communities have moved from facilities-based competition in the ICT space to one of services-based competition in which a single broadband network is deployed as a utility in each community and any company that is interested in providing services over it, is welcome to do so. Competition has flourished and in many communities, over thirty service providers compete with a wide range of services. Under a services-based competition model in which communities provide utility fibre infrastructure for all to use (like roads), communities are only competing with private enterprise if they choose to enter the services space as well. In pursuing this type of model, community options range from offering wholesale access to passive (conduit, dark fibre) or lit fibre networks, to providing both the network and services themselves.[53] Wholesale arrangements can be configured in at least two ways:

- If a services ecosystem exists, then the service providers interested in serving the area covered by the network would simply contract for wholesale access on some basis.
- If a services ecosystem has not been established, the community could either outsource retail service operations, establish their own, or contract for wholesale Internet, telephony, and television services and develop in-house administration, marketing, maintenance, and sales capabilities.

6.2 Comparative Costs

While the far reaching positive benefits of roads, water, power, and gas are accepted to the extent that the associated infrastructure is deployed without the need for return on investment or business case calculations, the fibre optic cabling required for broadband enablement is not – even though, as shown in the next chart, fibre is the least expensive to deploy.[54] Though difficult to quantitatively capture and include in an associated business case or plan, these off-balance sheet items should
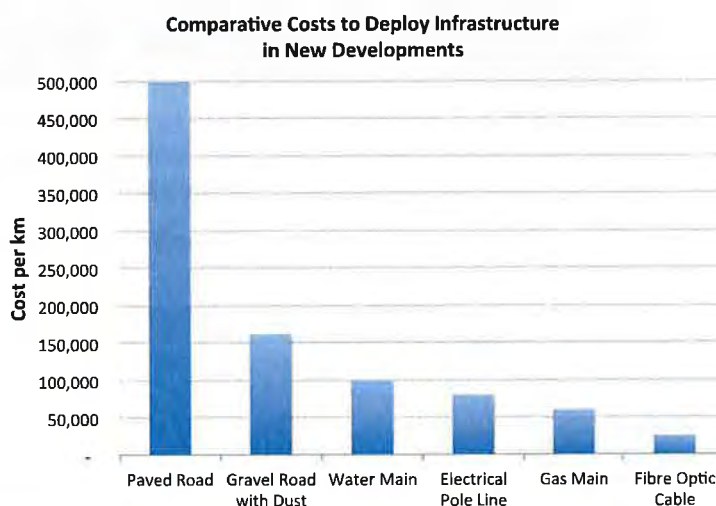


[53] Once services competition develops, these comn providers are welcome to connect. Today, competitive service providers are few and far between.

[54] WOWC; Regional Broadband Feasibility Study; WOWC-02-12; 2013 08 / Taylor Warwick Consulting

be noted. Indeed, positive externalities associated with adequate broadband connectivity and services infrastructure will occur in areas such as education, health, agriculture, tourism, resource monitoring and management, emergency services, government, improved prospects for employment, and regional economic development. When a targeted benefits study was completed for communities in the Wood Buffalo region, the benefits more than justified the cost differential to move from a fixed wireless to a full fibre deployment.[55]

6.3 Connectivity vs Broadband

In September, 2015, the City of Calgary adopted a dark fibre strategy based on the argument that facilitating Internet-based services is only one of six networks requiring connectivity in The City and that providing the required connectivity for all networks is The City's responsibility, particularly as space in their rights of way is limited and The City does not wish to have their streets continually dug up.
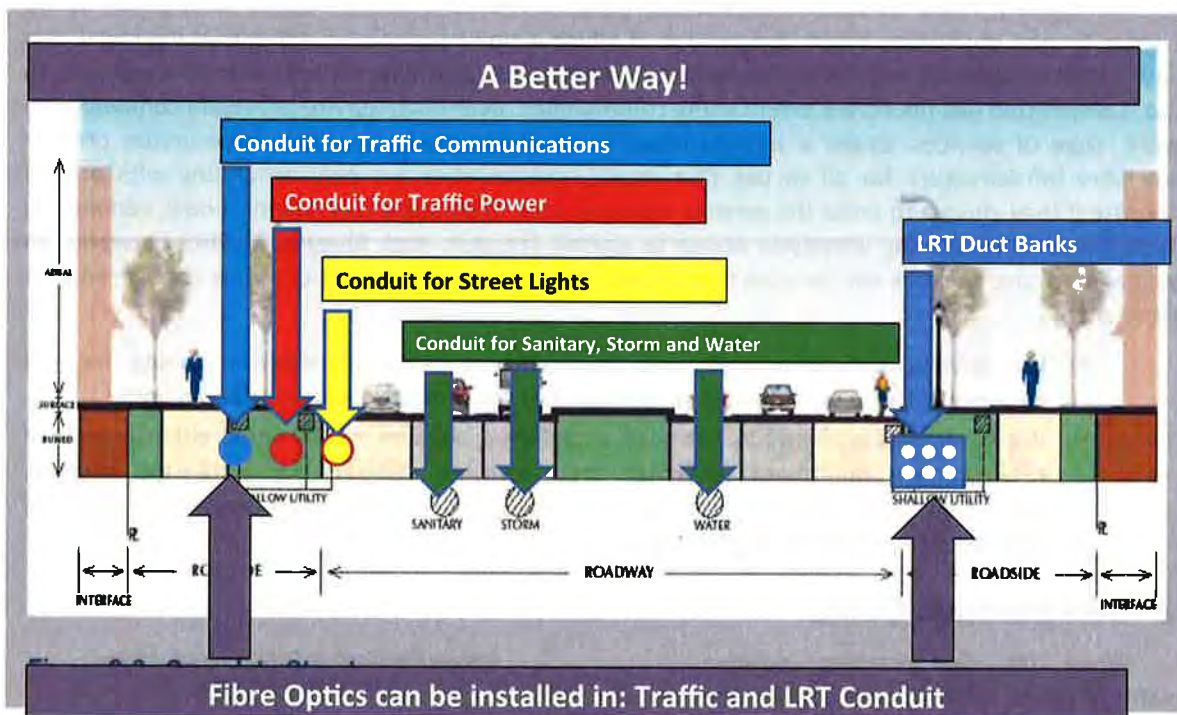
From The City's perspective, connectivity to some 230 remote offices, 450 traffic controllers, dozens of lift stations, and a multitude of transit and bus stations, traffic and security cameras, and so on is required.[56] Upon review, The City of Calgary found their four biggest challenges to be:[57]

- Managing the Rights of Way (ROW) – challenging now and will only get worse as duplicate infrastructure accelerates.
- Cost effective Connectivity for The City – Internet of Things (IoT) and Smart City Trends are drivers.

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[55] Dobson, Craig; *The True Economics of Broadband – A Benefits Analysis*; Taylor Warwick Consulting Limited; 2013 09 29.

[56] A video presentation on their strategy is available at: https://youtu.be/dQMzkz6oaqg

[57] Basto, David; *Building the Business Case for a Connected City*; City of Calgary; 16-03-10.

- Protecting City's ability to self-provision services – relies on infrastructure and access to ROW's.
- Community inequities are inevitable – What's the plan?

Their solution was to adopt a city-wide dark fibre strategy based on rich connectivity. Approved last September, the strategy aims to enable the connectivity required to create a healthy digital ecosystem and minimize disruption due to the civic construction required to provide it. The City will deploy dark fibre infrastructure and any others needing access to it will be able to.

The network will be run on an equitable, open access basis and will connect all communities in Calgary. The City will not be entering the retail telecommunication services arena, nor providing fibre to the home. Competitive providers will be able to extend The City fibre to the home for those purposes and The City will buy the access fibre back over time, so that all fibre will remain the property of The City and The City can therefore retain control of what it sees as critical civic infrastructure.
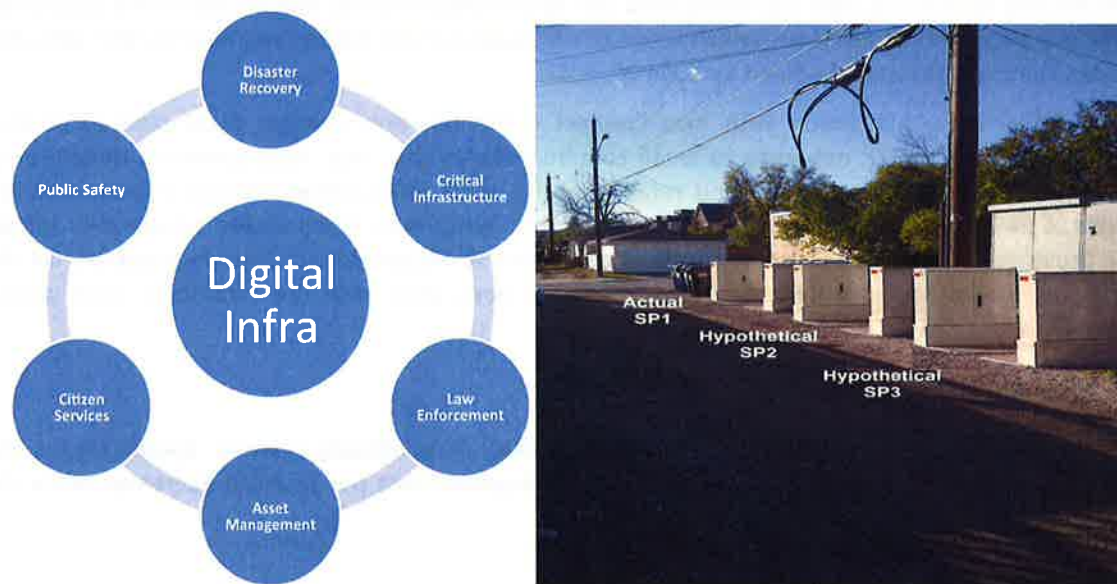
A presentation outlining The City of Calgary's approach can be viewed at:

https://youtu.be/dQMzkz6oaqg

Though the approach makes sense for larger centres and there are now three such efforts underway in Canada – Coquitlam, New Westminster, and most recently Campbell River – it is less applicable to smaller centres as those markets are not likely large enough to support more than one provider lighting up the network – in which case the "first provider in" gains a de facto monopoly.

6.4 Open Access

According to the Institute for Local Self-Reliance (ILSR), open access can be defined as:

> *An arrangement in which the network is open to independent service providers to offer services. In many cases, the network owner only sells wholesale access to the service providers who offer all retail services (ie: triple play of internet, phone, tv). Open access provides much more competition from which potential subscribers can choose.*

The ILSR then goes on to say: *in the competitive marketplace created, ISPs compete for customers and have incentives to innovate rather than simply locking out competitors with a de facto monopoly.* To date, in the US, some thirty open access networks are operational and some nine more are in

development.[58] Adding credibility to the open access model, in March, Google announced that it would provide services to the open access network being deployed in Huntsville, Alabama.[59]

With an insufficiently developed services market in North America, many communities like Olds have elected to position for open access down the road (the fibre network and ISP services are provided by separate entities), but initially sole source services to reduce risk and help ensure revenue streams sufficient to service the debt incurred to deploy the network. Once the debt has been retired or a competitive services ecosystem develops, the sole source arrangements may be revisited.
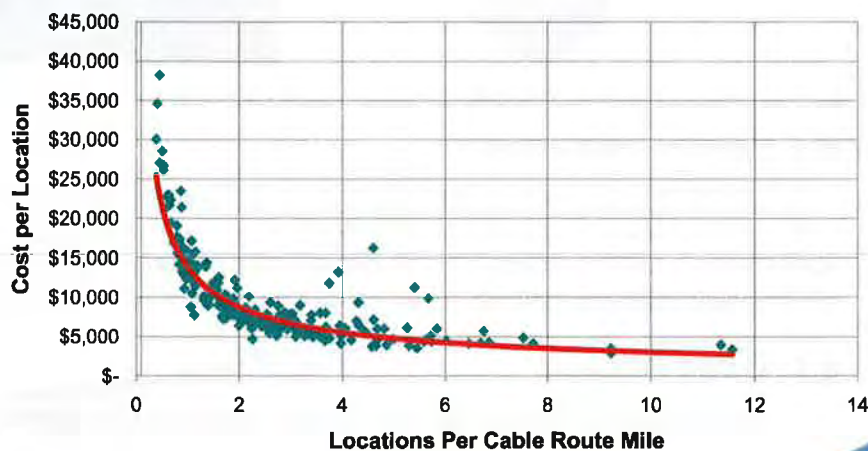
To ensure a level and transparent playing field, open access networks are best provided via structural separation in which wholesale-only providers remain wholly independent from the service providers using their network. Though the wholesale or carrier services divisions within the incumbent telecom and cable providers are not structurally separated, the CRTC requires operational separation between the divisions. Though the intent of the Alberta SuperNet agreements with Axia was to ensure wholesale-only operations, Axia has interpreted the agreements in a way that enables them to provide both wholesale and retail services – which is one of the issues Service Alberta will have to deal with as it evaluates contract renewal scheduled for June 30, 2018.

A similar issue has arisen with Axia Connect – the non-arm's length retail division of Axia NetMedia that offers FTTP networks to small communities. In this case, Axia Connect's definition of open access is that their wholesale and retail rates for their (lit) Internet connectivity services are available at the same rate to clients and service providers. Hence their 'open access' service only applies to the provisioning of voice and television services as their wholesale service includes Internet. On the other hand, Axia's alternate dark fibre leasing option does align with the traditional open access definition.

6.5 The Rural Challenge

In using Internet revenue to justify a network build, client density matters. Specifically, as the number of premises in a given area increases, the deployment cost per premise decreases while the potential revenue increases. The impact of this can be seen in the next chart from VantagePoint.[60] As the number of premises per cable route mile decreases, the cost per premise to deploy fibre increases. While the cost impact remains relatively small down to about 4 premises/mile, below that, it increases sharply. By one premise per mile, the cost has increased to US$14k/premise. A recent study for Clearwater

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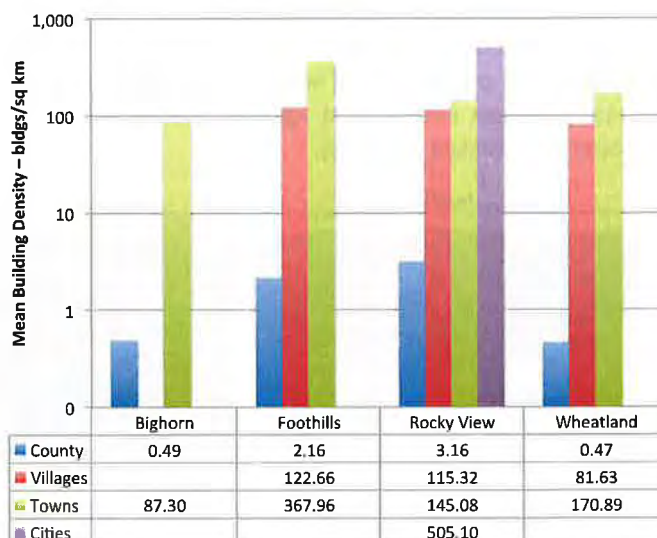[58] https://muninetworks.org/content/open-access

[59] https://potsandpansbyccg.com/2016/03/16/new-life-for-open-access-networks/comment-page-1/

[60] Thompson, L., Highly Demanding FTTH Deployments; VantagePoint Consulting; BB Properties Summit; 2011-04-27.

County indicated an acceptable business case down to about 4 premises/mile.

Premise density across the CRP region varies by just over a 1000-fold, from a low of 1 premise/two miles to the higher urban densities seen in Calgary and Airdrie. These differences will necessitate different strategies for the urban and rural areas in the region. Whereas fibre can be justified in clustered rural areas, wireless will be needed to cover lower density areas. In the chart, the crown-land in Bighorn has not been included and the premise counts in Wheatland were adjusted based on the number of Hutterite colonies.

	Bighorn	Foothills	Rocky View	Wheatland
County	0.49	2.16	3.16	0.47
Villages		122.66	115.32	81.63
Towns	87.30	367.96	145.08	170.89
Cities			505.10	

The trade-off between fibre and wireless tends to change over time and depends on available capital, local priorities, and the relative importance of off-balance benefits. A common misconception is that wireless systems are less expensive. While they may be so over a 3 to 5 year period, their ability to expand is limited and, over a ten year timeframe, can prove to be even more expensive than fibre networks.

The issue is that clients usage and the bandwidth required to run increasingly sophisticated applications increases over time – and not by a little. As mean usage is increasing by 21%/yr, a premise that's happily using a 5 Mb/s connection to day will likely require 30 Mb/s within 10 years. Of course, if the family expands from two parents to include 3 children, the bandwidth requirements will be 3 or 4 times that. When the overall cost of scaling wireless systems to meet that demand is compared to the higher upfront cost of deploying fibre in the first place, fibre will win almost every time.

7   Benefits of Broadband

7.1 The Knowledge Economy

The wealth of nations is changing. While prior centuries were dominated by nations with superior industrial or agricultural capabilities, the innovation age rewards new competencies and strengths. Knowledge – ideas and the people who generate them – is the new coin of the realm. Innovative capacity is the key driver of future economic prosperity... Our ability to remain a global technology (and thereby economic) leader will depend upon a variety of factors including our ability to maintain a world-class information infrastructure.

With respect to this last point – maintaining a world-class information infrastructure – there may be no element more critical today than ubiquitous and affordable high-speed Internet – broadband. The deployment and usage of broadband networks will significantly impact the global competitiveness of nations and businesses in the 21st Century.[61]

In the old economy, building a billion-dollar fortune required decades of hard work, a powerful host country, thousands of workers, and thousands of storefronts. Today, a kid with a smart idea, a couple of friends, and some luck can make a lot of money... very quickly. – Juan Enriquez

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[61] Understanding Broadband Demand; US Office of Technology Policy; 2002 11.

In their book, Revolutionary Wealth[62], the Toffler's argue that the impact of the information and communications technology (ICT) revolution is much deeper than commonly appreciated as it underlies a change in our system of wealth. Specifically, the world is in the process of transitioning to its third wealth system ever – from Agrarian (based on land/agriculture) to Industrial (based on machines) to Knowledge (based on ideas).

Agrarian   **Industrial**   **Knowledge**

With a change in the wealth system, what made communities successful in the 20th century no longer works today. We are moving from a world in which scalable efficiency generated the most value to one in which scalable peer learning does.[63] The most significant impacts of this unfolding transition relate to economic innovation and productivity and societal organization. As a foundational cornerstone of these emerging systems of wealth creation, access to ICT has become critical to sustainable economic development in virtually every community and society on the planet.

7.2 Economic Development

The deep fundamental economic, environmental, and social changes enabled by developments in information and communications technology have been well documented and are recognized by the CRP. Indeed, broadband initiatives have the potential to dramatically and positively impact the fabric of life throughout a community by offering exceptional network services; learn-in-place, work-in-place, and age-in-place opportunities for all generations; innovation and diversification in every economic sector; and enabling any municipality to position its brand as dynamic, progressive, and relevant to the future.

There are perhaps two perspectives to economic development. One, which is dealt with below, is the rear-view mirror approach which evaluates the evidence of benefits realized to date. While the evidence exists, it is not as striking as one might like. Issues include:

- Attribution – as economic development is driven by many factors often acting in unison, isolating just the benefits associated with higher speed broadband is often difficult.
- Based on the techno-economic framework presented earlier, the broadband evolution is only now entering its 'golden age'. The best, therefore, is still yet to come.

The second approach is to look forward and establish the case for the scenario in which the broadband infrastructure does not become generally available. Looking forward is not typical of traditional economic studies, but the case can to some extent be surmised by estimating the impacts of your residents and business not being able to participate in the virtual workplace of 2020+ as outlined in Sec. 4.5 on social implications, missing out on the Consumer Surplus (Sec. 7.3) and being precluded from both capitalizing on the developments outlined in Subsec. 5.1.1 – The ERaChA Era and missing out on the opportunities discussed in Sec. 7.5.

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[62] Toffler, A.&H.; Revolutionary Wealth; Knopf; 2006-04-25.

[63] John Hagel III; The Shift Index; 2009 07.

So what is broadband? To many, including the Federal Government, broadband is simply the next step above dial-up services in which you move from having to dial-up and establish a connection to the Internet every time you wish to check email or surf – and then hang-up afterwards, to an always-on service that is permanently connected to the Internet. Whereas dial-up connections had bit rates up to 56 kb/s, initially deployed always-on services typically sported bit rates of 1.5 to 5 Mb/s in the downstream (Internet to client) direction and 0.2 – 0.5 Mb/s in the upstream or reverse direction. This uneven provisioning of two-way bandwidth was intended to accommodate media consumption activities such as web-surfing and the downloading of software, files, music, and video versus more symmetric (equal up and down bit rates) communication services such as video conferencing, the uploading of client files for back-up or remote use, and cloud-based services.

The step-change from dial-up to these always-on services was and is significant. Though by today's standards, these always-on services are relatively low in bandwidth, they remain widespread and were sufficient to facilitate many of the productivity gains realized in the commercial sectors. Having been around the longest, they provide the basis on which many of the economic impact statistics quoted today were developed. According to these statistics, some 2.7% of GDP in Canada is attributable to the Internet (2009) and 75% of the Internet's impact arises from productivity impacts in traditional (non-ICT) industries.[64]

The impact on businesses that these statistics represent is profound. According to Fred Harmon:[65]

Internet facilitates the move from an industrial to a knowledge-based society, from a society based on physical effort to one based on mental effort, and from reliance on limited material resources to dependence on virtually unlimited intangible resources.

Not only does this enable the acceleration of change, it fundamentally changes the parameters of business.

Consider the Creative Coast comparison in the adjacent chart. According to this comparison:

- TCCi created over 200 jobs in the knowledge sector with only $1M.
- Daimler-Chrysler's $320M auto manufacturing plant created only 3,000 jobs, meaning each job cost over 20 times more to create than a job in the knowledge sector.
- A dollar invested to create a knowledge job yielded 23 times more real wages.

While the table-stakes to partake in and benefit from these changes is always-

Job Cost Comparison

TCCi KBB Creation vs. Daimler-Chrysler Project

	DAIMLER-CHRYSLER	TCCi
total jobs created	3000	212
total project expenditures	$320,000,000	$1,041,250
total annual wages created	$164,805,000	$12,303,420
project cost per job created	$106,666	$4,912
wages generated/$ spent	$0.51	$11.82
wages generated/acre	$96,944	$11,607,000

[64] Pélissié du Rausas, Matthieu, et al; *Internet Matters: The Net's sweeping impact on growth, jobs, and prosperity*; McKinsey Global Institute; 2011 05.

[65] Harmon, Fred; Business 2010: Positioning Your Company and Yourself in a Rapidly Changing World; Kiplinger Books; 2001

on access to the Internet platform, in today's world, symmetry and bandwidth matter too – and the higher the available speed and bandwidth, the better. Access, so to speak, has not been created equal and in a very fundamental way, not only does bandwidth matter, as shown below, it matters a lot. To attract business, minimum access bit rates of 100 Mb/s are typically required. [66]

	CRP						Target
Speeds Needed by 2013 to:	**2–4 Mb/s**	**10–12 Mb/s**	**20–25 Mb/s**	**100–120 Mb/s**	**500 Mb/s**	**1 Gb/s**	**100+ Mb/s**
Attract business	17 (8%)	26 (12%)	30 (13%)	43 (19%)	33 (15%)	77 (34%)	68%
Retain business	13 (6%)	35 (16%)	50 (22%)	57 (25%)	33 (15%)	37 (16%)	56%
Make business more competitive	12 (5%)	29 (13%)	53 (23%)	55 (24%)	33 (15%)	44 (19%)	58%
Revive business districts	13 (6%)	34 (15%)	50 (23%)	53 (24%)	34 (15%)	38 (17%)	56%
Revive communities	14 (6%)	40 (18%)	47 (21%)	55 (25%)	27 (12%)	37 (17%)	52%
Improve training	14 (6%)	33 (15%)	48 (22%)	54 (24%)	40 (18%)	33 (15%)	57%

Note that this survey was completed in 2010 and indicated that to be competitive, minimum speeds of 100 Mb/s would be required by 2013. It's now 2016 and the fastest upstream bandwidth generally available outside of Calgary is still only 10 Mb/s.

According to an Ericsson study[67], the economic impact of bandwidth upgrades spread throughout the economy via direct, indirect, and induced effects as shown below.
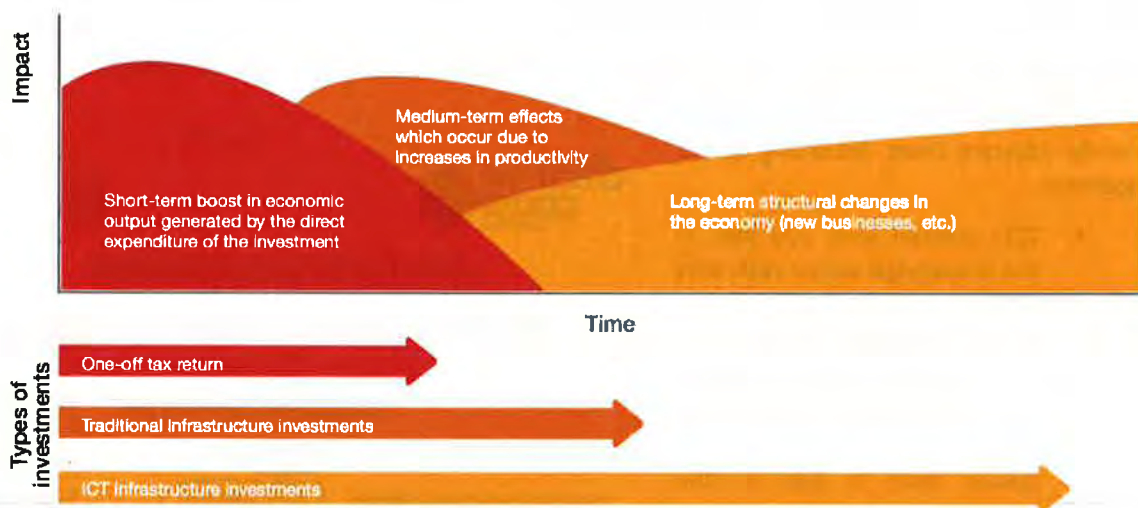
The benefits of faster broadband can be categorized as:

- Economic effects, including increased innovation and productivity in business
- Social effects, including better access to services and improved healthcare
- Environmental effects, including more efficient energy consumption

Economic, social and environmental impacts are outlined in the table below.

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[66] Settles, Craig; *Broadband and Economic Development: The Real Deal*; Broadband Properties; 2010-11/12.

[67] Ericsson, Arthur D Little. & Chalmers University of Technology; Analyzing the Effects of Broadband on GDP; 2013.

Economic	Social	Environmental
> Rise in GDP as direct economic production increases in the short term thanks to the deployment of network facilities	> Consumer benefits include better social relations between people regardless of distance, e.g. through social media	> Providers will have the capability to deal with larger amounts of digital content online (dematerialization) leading to:

> New jobs created to construct and set up the new infrastructure	> Higher broadband speeds also enable:
	  – Improved services, e.g. video sharing
		– Video conferencing
		   – Less need for paper
		   – Telecommuting

> Increased productivity in the medium term due to time saved and increased mobility	– Enhanced online gaming experiences and higher quality of online media content and HD streaming	> New types of computer and network services, such as:
> Increased innovation and new ways of doing business enabled by increased broadband speed, leading to:	> Improved education levels through feature-rich e-learning experiences	– Smart grids – Smart homes

– More advanced online services
   – New utility services
   – Telecommuting
	> Improved welfare such as e-health services to improve quality of life	– Improved congestion management systems

Quantifying these off-balance-sheet benefits is difficult, but according to the detailed Ericsson study, doubling broadband speeds for an economy can add 0.3 percent to GDP growth.[68]

In a study by Stephen Ross[69], the 1,500-plus US counties, in the top half of their states in terms of access to at least 25 Mb/s broadband, enjoyed 10 times the percentage population growth of the bottom half. The bottom 10 percent in each state, in aggregate, actually lost population.

Returning to the Ericsson study, upgrading from 0.5 Mb/s to 4 Mb/s in OECD countries increases income by around US$322 per month, and gaining 4 Mb/s of broadband increases household income by US$2,100 per year. Faster broadband speed:

- boosts personal productivity and allows for more flexible work arrangements;
- opens up possibilities for more advanced home-based businesses as a replacement, or complement to, an ordinary job; and
- enables people to be more informed, better educated and socially and culturally enriched – ultimately leading to a faster career path.

According to recent surveys, fibre-to-the-home (FTTH) communities realize significant economic benefit:[70]

- 11% of FTTH users have a home-based business averaging CDN$10,700 in estimated incremental income from outside the community. Assuming 50% take-rates (half the potential client base takes service), these activities increase community revenue by an average of CDN$0.59 million per 1,000 homes passed.

- FTTH drives as many as 65 new traditional jobs per 1,000 homes passed when leveraged. At a more conservative 25 new jobs per 1,000 homes passed and CDN$49,000/worker/year in wages, this means $1.2 million in new income to the community per 1,000 homes passed.

Estonia, Slovenia, Slovak Republic, and Turkey are among the 16 countries that outrank Canada in percentage of FTTH connection.

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[68] Ericsson, Arthur D Little. & Chalmers University of Technology; Socioeconomic Effects of Broadband SpeeSocioeconomic Effects of Broadband Speed; 2013 09.

[69] Ross, Stephen; Bad Broadband Equals Low Population Growth; BBC; 1411/12.

[70] Render, Michael; *FTTH and Economic Impact*; RVA LLC; Broadband Summit, 2013 04.

- In total, FTTH therefore increases aggregate household income by $1.79 million per 1,000 homes passed.

In rural areas, results suggest that high levels of broadband adoption in rural areas do causally (and positively) impact income growth as well as (negatively) influence unemployment growth. Similarly, low levels of broadband adoption in rural areas lead to declines in the number of firms and total employment numbers in the county.[71]

A more recent US review of the benefits accruing to Chattanooga and the surrounding Hamilton County based on the availability of broadband speeds at symmetric rates of 100 Mb/s and up were found to be widespread. The mean premise density across the County is 48 premises/km^2 and that in Chattanooga is 226. Overall population is 351k. Economic and social benefits were estimated to be CAD$2900 annually per home passed. As can be seen, value arose from many unexpected places.

When asked if Olds had seen an increase in business attraction over the past year due to the availability of community-based Gb/s O-Net services, Mitch Thomson, Executive Director of the Olds Institute for Community & Regional Development (OICRD) – the economic development organization behind the fibre initiative – replied:

'Yes absolutely, we perhaps could have been better prepared to capitalize on interest. Our lack of serviced available land has hindered some. We are fielding lots of interest.'

The availability of gigbit services ubiquitously throughout Olds has enabled Olds College to revamp its educational delivery platforms and the local hospital to provide unprecedented levels of wi-fi service to both patients and staff.
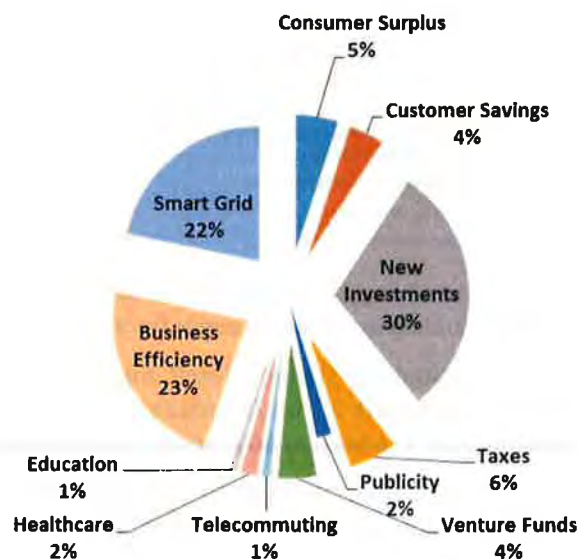
7.3 Consumer Surplus

Consumer surplus relates to the difference between what the true value of a item is and what it is bought or sold for. *'The value of Google or Facebook to users relative to their price, which is nearly free, is enormous. The founders of these companies may get rich, but they capture only a fraction of the value created by their innovations.'* Consumer surplus is the difference between the true value to the consumer relative to the actual cost. While important, obtaining firm numbers relating to consumer surplus, as is evident, is tough. However, assuming consumer surplus scales with usage, given usage has exploded since 2000, the value of consumer created via free Internet search and social media must be very large and growing. In the following figure[14], based on population, the Canadian equivalent numbers would be about 11.2% of those for the US.

For these values to be fully realized, ubiquitous connectivity is required – and those not able to participate are significantly disadvantaged.

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[71] Whitacre, B.; et al; BB's Contribution to Economic Health in Rural Areas: A Causal Analysis and an Assessment of the Connected Nation' Program; Telecommunications Policy Research Conference; 2013-09-27/29.

Consumer surplus through free Internet search and social networking applications has accumulated mainly within the past decade

Annual Google searches[1]
Trillion

178 million
unique monthly
US visitors (2014)

Social media usage[2]
US adults using a social
networking site (million)

74%
of online US adults are
on social media (2014)

Wikipedia article count
English-language articles on
Wikipedia (million)

**100 million**
unique monthly
US visitors (2014)
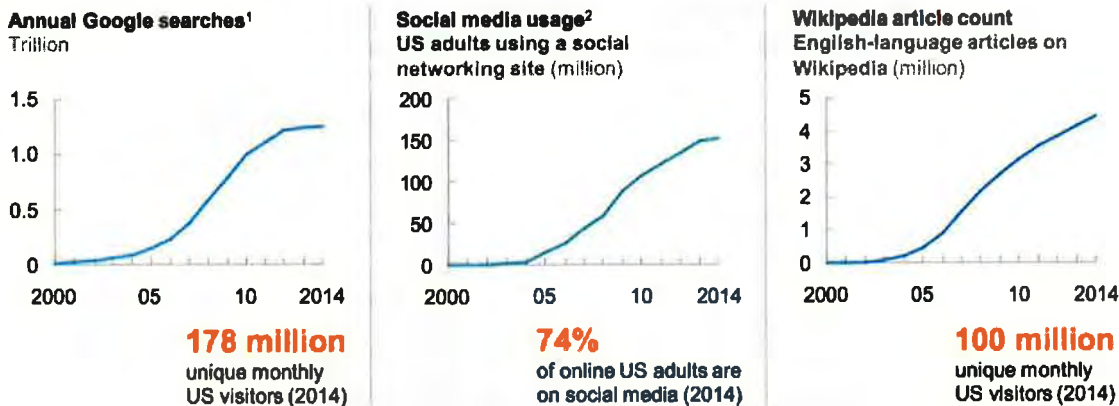
1 2013 and 2014 extrapolated using constant growth rate from 2012 to 2014 derived from December search volume.
2 2003 and 2004 estimated using user growth numbers from early social networking sites, including Friendster, Myspace, and Facebook, and assumptions for
   user growth on other niche sites.

SOURCE: Pew Research Center; Google; Internet Live Stats; Wikipedia; ComScore; McKinsey Global Institute analysis

7.4 Impact of Home Values

When shopping for a new home, the availability of FTTP-based services has become important. Interestingly, it's more important for those who have benefited from the services before – it's not something they wish to give up.[72]

The availability of FTTP services in a neighbourhood and Gb/s services to the home adds 1.3% and 1.8% respectively to the retail value of a home.[73] Together, these effects would add $15,500 to the value of a $500k home.
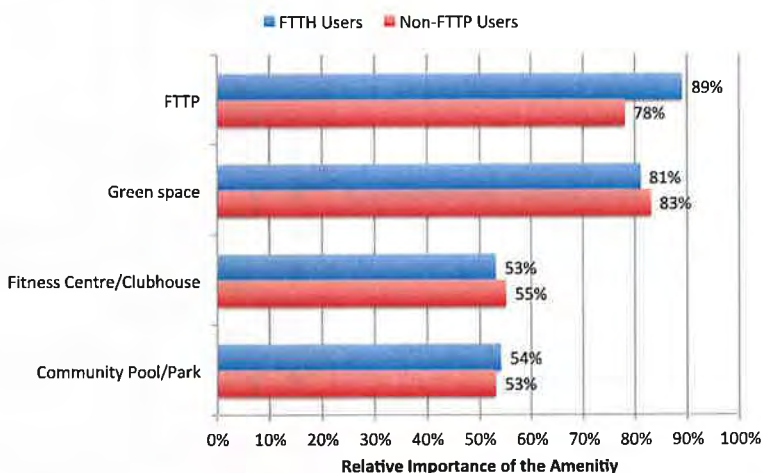
7.5 Opportunity

The benefits of ubiquitous, affordable broadband are many and varied. Indeed, many have already been mentioned – but we have only just begun. In late 2015, the McKinsey Global Institute released the results of survey indicating where a number of industries were with respect to 'digitization' and how much remains to be done. The results appear in chart below.[20] In the chart, green is good and red leaves room for improvement. As can be seen, many of the industries that impact rural Canadians, such as mining, hospitality, entertainment and recreation, construction, and agriculture are shaded red. Also red are a number of public services such as government and healthcare. In these, there is an interplay between internal IT services and external connectivity. According to McKinsey, areas numbered 2 through 6 will benefit from increased digitization and broadband.

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[72] Render, M.; The FTTH Revolution; RVA LLC; 2013-05.

[73] FTTH Council; What Fiber Broadband Can Do For Your Community; Broadband Communities; 2015-11.

The MGI Industry Digitization Index
2015 or Latest Available Data

Relatively low digitization ▮▮▮ Relatively high digitization

● Digital leaders within relatively undigitized sectors

Sector	Overall digitization[1]	Assets		Usage				Labor			GDP share %	Employment share %	Productivity growth, 2005–14[2] %
		Digital spending	Digital asset stock	Transactions	Interactions	Business processes	Market making	Digital spending on workers	Digital capital deepening	Digitization of work			
ICT											5	3	4.6
Media											2	1	3.6
Professional services											9	6	0.3
Finance and insurance											8	4	1.6
Wholesale trade											5	4	0.2
Advanced manufacturing											3	2	2.6
Oil and gas											2	0.1	2.9
Utilities											2	0.4	1.3
Chemicals and pharmaceuticals											2	1	1.8
Basic goods manufacturing											5	5	1.2
Mining											1	0.4	0.5
Real estate	●										5	1	2.3
Transportation and warehousing	●										3	3	1.4
Education	●										2	2	-0.5
Retail trade	●										5	11	-1.1
Entertainment and recreation											1	1	0.9
Personal and local services											6	11	0.5
Government	●										16	15	0.2
Health care											10	13	-0.1
Hospitality	●										4	8	-0.9
Construction											3	5	-1.4
Agriculture and hunting											1	1	-0.9

1 Based on a set of metrics to assess digitization of assets (8 metrics), usage (11 metrics), and labor (8 metrics); see technical appendix for full list of metrics and explanation of methodology
2 Compound annual growth rate.

SOURCE: BEA; BLS; US Census; IDC; Gartner; McKinsey social technology survey; McKinsey Payments Map; LiveChat customer satisfaction report; Appbrain; US contact center decision-makers guide; eMarketer; Bluewolf; Computer Economics; industry expert interviews; McKinsey Global Institute analysis

① Knowledge-intensive sectors that are highly digitized across most dimensions

② Capital-intensive sectors with the potential to further digitize their physical assets

③ Service sectors with long tail of small firms having room to digitize customer transactions

④ B2B sectors with the potential to digitally engage and interact with their customers

⑤ Labor-intensive sectors with the potential to provide digital tools to their workforce

⑥ Quasi-public and/or highly localized sectors that lag across most dimensions
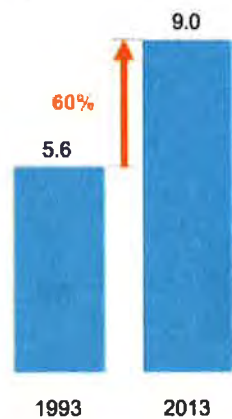
As shown below, the benefits or opportunity to be realized are real and directly affect both corporate and municipal bottom lines.[20] Profit margins in Health-care, resource extraction, transportation, and utility industries – all of which have a significant presence in many rural areas – remain to be significantly improved.

US profit margins have risen 60 percent in two decades, with industries on the digital frontier at the forefront

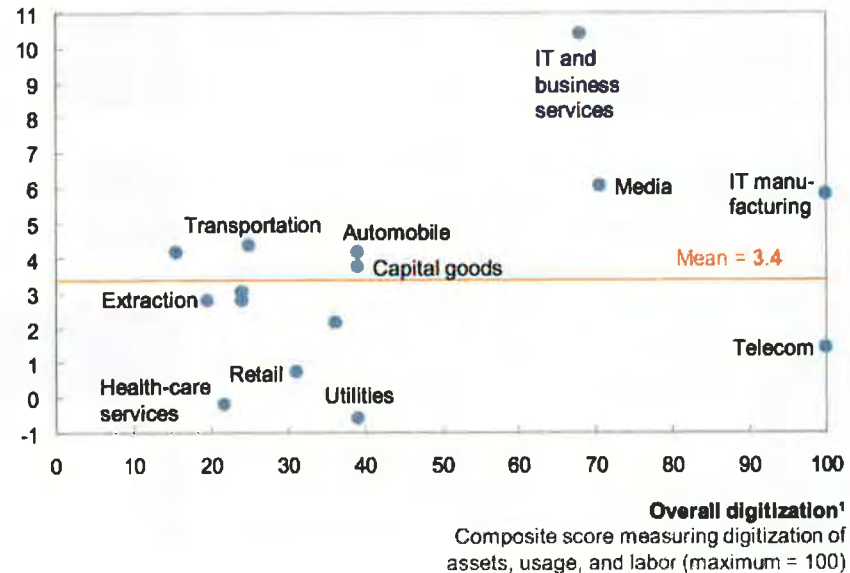Growth in profit margin vs. digitization, select US non-financial industries

Profit margin growth, 1993 vs. 2013
3-year average for all non-financial industries
%

Change in post-tax profit margin, 1993 vs. 2013
3-year averages

Overall digitization[1]
Composite score measuring digitization of assets, usage, and labor (maximum = 100)

1   Measured using a set of 27 metrics spanning the three dimensions of digitization: assets (eight metrics, including spending on digital assets and the stock of digital assets), usage (11 metrics, including transactions, business process, interactions, and market making), and labor (eight metrics, including digital capital deepening, share of occupations that are digital, and share of tasks that are digital).

As shown in the next chart, overall, McKinsey estimates that the US GDP could be improved by some $2.2 trillion dollars by 2025 based on only three effects of digitization. Given the 2015 US GDP of US$17.9T, this represents a CAGR of 1.16%. With Canada's 2015 GDP estimated to be US$1.55T, comparable growth would add US$190G. The two biggest contributors to this increase come from Labour and operations & supply chain, both of which significantly benefit from improved broadband.

At a more personal level, typically mentioned considerations are:

- Earning a living (making money)
- Learning (inside and outside the classroom)
- Health care (inside and outside the clinic)
- Civic engagement (democratic participation)
- Commerce (shopping, e-commerce)
- Recreation (gaming, gambling, puzzle solving, etc.)
- Security (remotely monitoring shut-ins, livestock, property, etc.)
- Lifestyle (where do you want to live?)
- and so on...

By 2025, Three Effects of Digitization Alone Could Boost Annual U.S. GDP by Up to $2.2 Trillion

Value of incremental GDP in 2025
$ billion, nominal

■ Low estimate   ☐ High estimate

Category		Details	Low estimate	High estimate
Labor: Increased supply and productivity		• Increased labor force participation • Better and faster matching of workers with employers • Increased productivity of workers in the labor force		500
Capital: Improved asset efficiency		• Preventive maintenance decreases downtime and reduces expenditure on maintenance • Increased utilization of assets	250	400
Multi-factor productivity	**R&D and product development**	• Better use of data leads to new inventions • Faster product development cycles enabled by better testing and quality control	200	350
	Operations and supply-chain optimization	• Real-time monitoring and control of production lines • Better logistics routing through path optimization and prioritization	600	850
	Resource management	• Improved energy efficiency through intelligent building systems • Increased fuel efficiency • Decreased waste of raw materials	40	50

These opportunities alone could add $1.6 trillion to $2.2 trillion to annual GDP by 2025. However, this sizing is not comprehensive and only reflects the applications we have analyzed in this report. The potential for technology-fueled growth is much wider.

NOTE: Numbers may not sum due to rounding

SOURCE: McKinsey Global Institute analysis

[18] For more on IoT technologies, their applications in various settings, and their economic potential, see *The Internet of Things: Mapping the value beyond the hype*, McKinsey Global Institute, June 2015.

Given the issues of isolation and distance, the availability of broadband is perhaps even more critical in the rural areas. A recent information pamphlet out of North Carolina expressing their concern appears on the next pages.[74]

More generally, for rural and remote communities, broadband creates opportunities to:

- Reduce or eliminate social and economic limitations of isolation
- Access broad new frontiers of social and economic development
- Greatly improve the development, retention and attraction of youth, workers and enterprises
- Bring balance and vibrancy to urban-rural dialog
- Improve access to government services, reduce cost of services.
- Improve access to ratepayers, and responsiveness to local needs and opportunities.
- Reduce municipal operating costs (travel to meetings, etc.)

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[74] Rural NC Deserves Modern Broadband; GLIC-NC, ILSR, & Community Networks; 2015

- Enable fuller participation in economies, societies and politics of the 21st century and beyond.
- Reduce financial, social and environmental costs of participation.

Fast, Affordable, Modern Broadband: Critical for Rural North Carolina – While urban centers get superfast Internet networks, rural regions of North Caroline depend on sluggish DSL, ancient dial-up, or have no connectivity at all. Rural access to modern, broadband Internet is more important that ever in North Carolina, where <u>80% of the counties are rural</u>.

Essential for the 21st Century:

The Rural Economy, Jobs, and Growth

- Over 80% of Fortune 500 companies require online job applications.
- Telecommuting keeps rural town populations strong.
- Fiber connections **increase home values**.
- Companies seek rural areas for **data centers**, distribution centers, and other large facilities.
- Small businesses need high upload speeds for services such as cloud computing and offsite backup.

Rural Schools and Colleges

- Printed public schoolbooks will not be funded after 2016 (per **H.44/S.L. 2013-12**); high-speed connectivity is essential to complete student homework.
- Rural schools need broadband for digital learning initiatives on par with schools in urbanized areas.
- **College distance learning** overcomes barriers of income and geography.

Healthcare

- Telemedicine **removes distance barriers** to cutting-edge medical technology for those that cannot travel safely, are in emergency situations, or cannot afford to visit urban clinics.
- Elderly, military veterans, and other patients can be diagnosed, treated and monitored from home.
- Elderly can live at home longer, reducing the cost of eldercare and improving quality of life in later years.

8   Infrastructure versus Digital Dividends

8.1   A Culture of Use

In the framework established in the in the recently released World Development Report on the Digital Dividends[8] and appearing below, the connectivity piece, the primary focus of this CRP project, is but one of three components to realizing the full potential of the transformations enabled by digital technologies and connectivity. As communities move to resolve their connectivity issues, for the benefits to be most broadly realized, concomitant digital enablement programs and policy to mitigate the risks will be required as well.

By reducing information costs, digital technologies greatly lower the cost of economic and social transactions for firms, individuals, and the public sector. They promote innovation when transaction costs fall to essentially zero. They boost efficiency as existing activities and services become cheaper, quicker, or more convenient. And they increase inclusion as people get access to services that previously were out of reach.
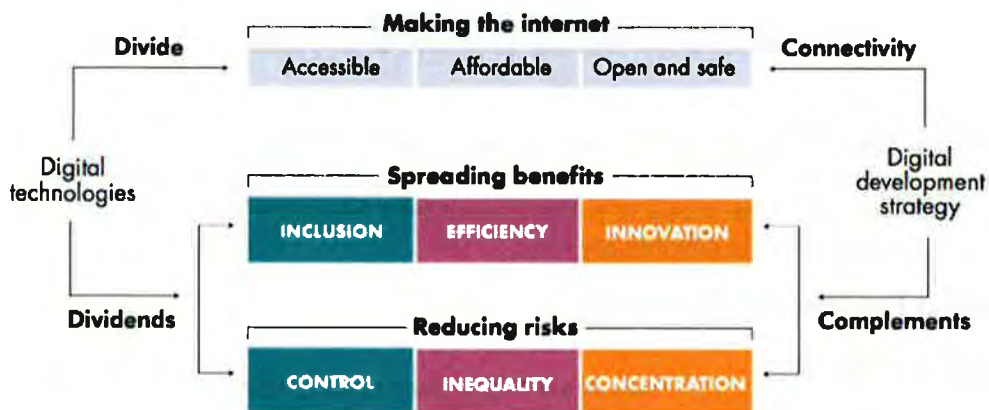
The benefits of digital technologies filter throughout the economy. For businesses, the Internet promotes inclusion of firms in the world economy by expanding trade, raises the productivity of capital, and intensifies competition in the marketplace, which in turn induces innovation. It brings opportunities to households by creating jobs, leverages human capital, and produces consumer surplus. It enables citizens to access public services, strengthens government capability, and serves as a platform for citizens to tackle collective action problems. These benefits are neither automatic nor assured, but in numerous instances digital technologies can bring significant gains.

Spreading the Benefits   **Reducing the Risks**
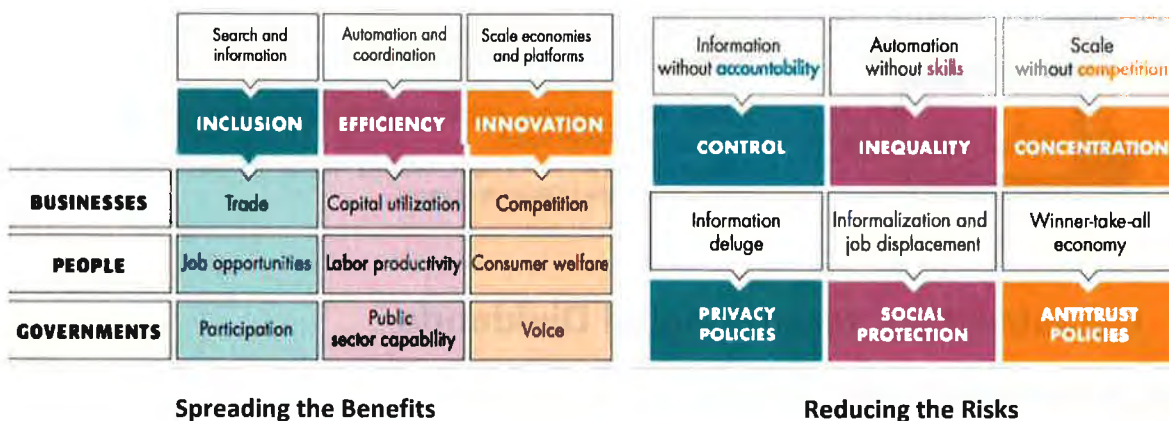
So, the Internet can be an effective force for development. But as the Report documents, *the benefits too often are not realized, and the Internet sometimes makes persistent problems worse. Why? The key insight is that for complex occupations, business activities, or public services, the Internet usually can make only a portion of tasks cheaper, more efficient, or more convenient through automation. Another portion still requires capabilities that humans possess in abundance but computers do not. Many traditional tasks of an accountant or bank teller are now automated, such as making calculations or processing withdrawals. Others require complex reasoning or socio-emotional skills, such as designing tax strategies or advising clients. Likewise, many public services involving provision of information or*

routine permissions can be automated. But others, such as teaching or policing, need a high degree of human discretion, tacit knowledge, and judgment.

Many problems and failures of the Internet surface when digital technology is introduced but the important analog complements remain inadequate. What are these complements? The main ones are regulations that ensure a high degree of competition, skills that leverage technology, and institutions that are accountable.

- *When the Internet delivers scale economies for firms but the business environment inhibits competition, the outcome could be excessive **concentration** of market power and rise of monopolies, inhibiting future innovation.*

- *When the Internet automates many tasks but workers do not possess the skills that technology augments, the outcome will be greater **inequality**, rather than greater efficiency.*

- *When the Internet helps overcome information barriers that impede service delivery but governments remain unaccountable, the outcome will be greater **control**, rather than greater empowerment and inclusion.*

The interplay between Internet investments and reforms in complementary areas is at the core of policy debates about technology impacts. A 2008 study by Claudia Goldin and Lawrence Katz, drawing on earlier work by Jan Tinbergen, framed these dynamics in the labor market as a "race between education and technology." As technology progresses, some skills become obsolete. Workers must acquire new skills that help them become more productive with the help of that technology. Adjustment takes time and will be painful for many, but this is how economies progress. The sections that follow discuss risks and complements in the private sector, in labor markets, and in the public sector.

Strengthening analog complements will ensure a high social and economic return from digital invest-ments. But a downside risk remains. Returning to the Report's framework, large-scale collection of Identifiable Information creates privacy and security concerns. Automation changes work in ways that challenge existing social protections and reveal the inadequacy of existing labor laws. And scale economies create antitrust concerns. Digital safeguards that mitigate these risks become increasingly important as the digital transformation proceeds.

8.2 Digital Divides

8.2.1 Definition

A digital divide is an encompassing term that generally refers to economic or social inequality with regard to access to, use of, or impact of ICT. The divide within countries may refer to inequalities between individuals, households, businesses, or geographic areas, usually at different socioeconomic levels or other demographic categories.

8.2.2 Adoption

Adoption rates of digital technologies are highest at the individual level, lower for businesses, and lowest with governments. In Canada, the rates come in at 84.4%, 62.6%, and 59.3%, respectively. As correlations to GDP are weakest for Governments, it is not a significant concern. The low business rating, however, is [8] and a more detailed discussion of the resulting opportunity areas can be found in Sec. 7.5.
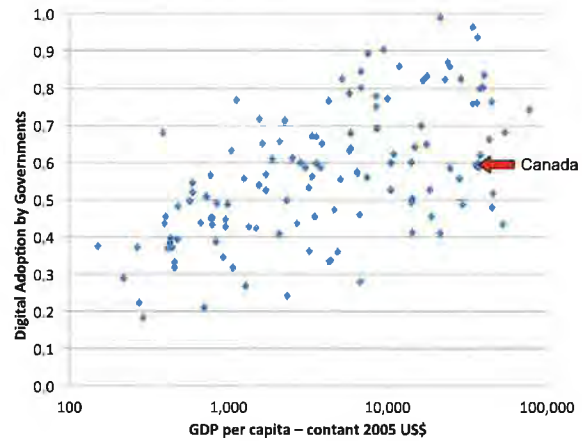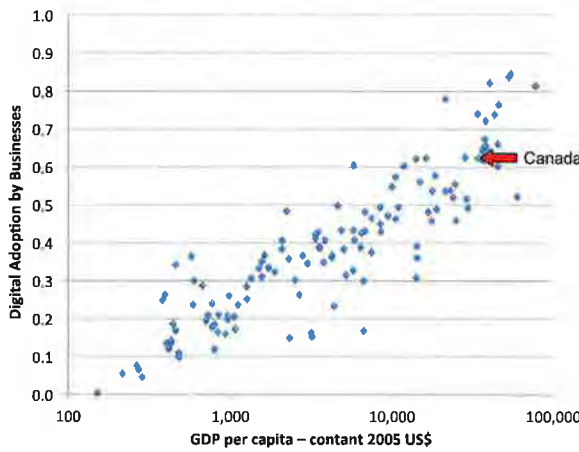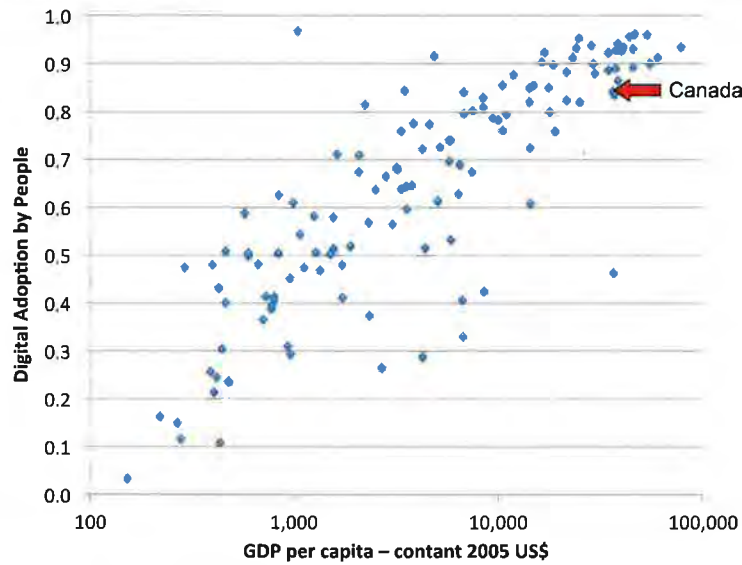
8.2.3 Age & Income

That digital adoption tends to decrease with age is well known. The divide between Internet usage between 16-24 year olds and 65-74 year-olds for a selection of countries appears in the next chart. In Canada, the gap is about 40%.[8] An interesting side-effect of this divide is the propensity of those under 24 to either give up traditional telephone and cable subscriptions or never subscribe in the first place.[75]

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[75] Communications Management Inc.; Canada's Digital Divides; 2015-08-20.

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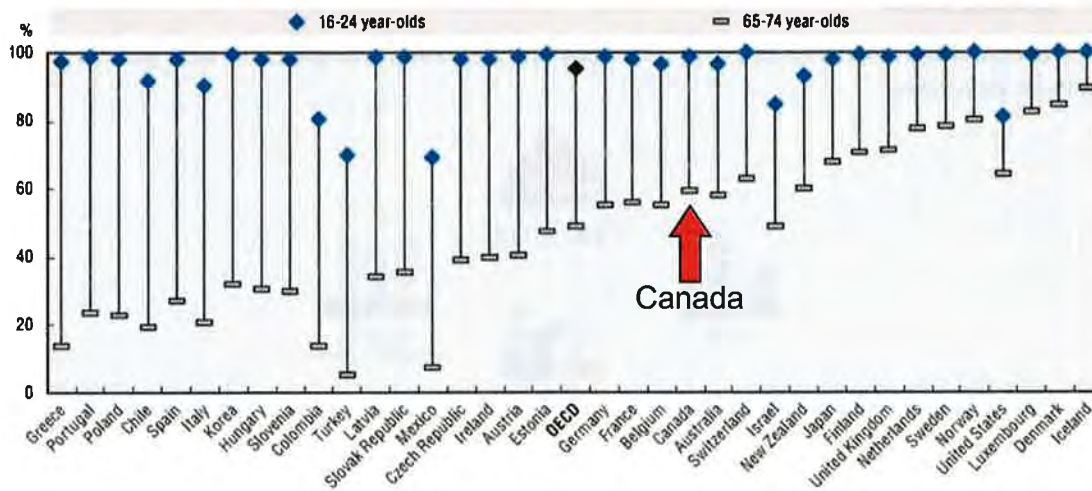
A more detailed breakdown by age and income for Canada indicates that: *The digital divide remains consistent across all demographics with wealthier households far likelier to use the Internet than poorer ones regardless of their age. For example, Statscan reports that 47.5 per cent of Canadians aged 65 and over use the Internet (up from 40.2 in 2010), the biggest jump of any age group. However, there is a major divide in Internet use based on household income. While 66.7 per cent of households over the age of 65 in the top half of income use the Internet, that number drops to only 28.5 per cent for the poorest quartile of households.* [76]
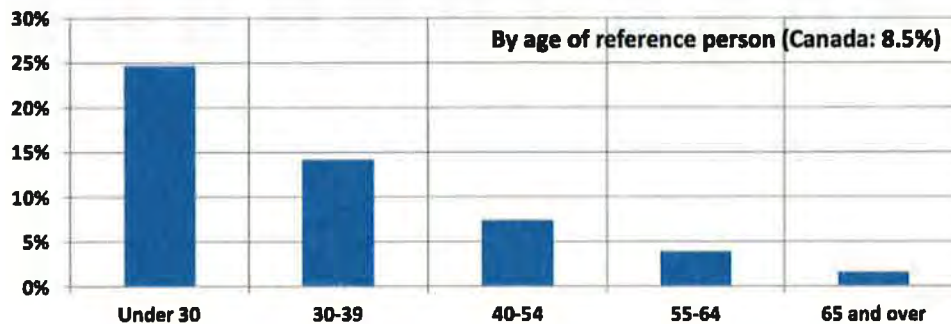
High-speed home Internet connection

Age group of reference person	Total	Income quintile				
		Lowest	Second	Third	Fourth	Highest
All households	80.1%	54.6%	72.0%	85.5%	92.1%	96.1%
Under 30	87.0%	74.4%	85.7%	91.8%	95.1%	97.2%
30-39	89.5%	71.3%	86.9%	90.9%	96.5%	95.6%
40-54	88.0%	66.0%	79.5%	92.4%	92.8%	97.2%
55-64	80.6%	55.8%	73.7%	83.8%	88.4%	96.6%
65+	58.2%	30.5%	52.7%	71.6%	86.4%	89.4%

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[76] CIRA; Internet Fact Book 2014: see: https://cira.ca/factbook/2014/the-canadian-internet.html

8.2.4　Urban/Rural

Broadband is available to 100% of Canadians in urban areas, compared to 85% in rural areas.[74] It is also more expensive.[77]
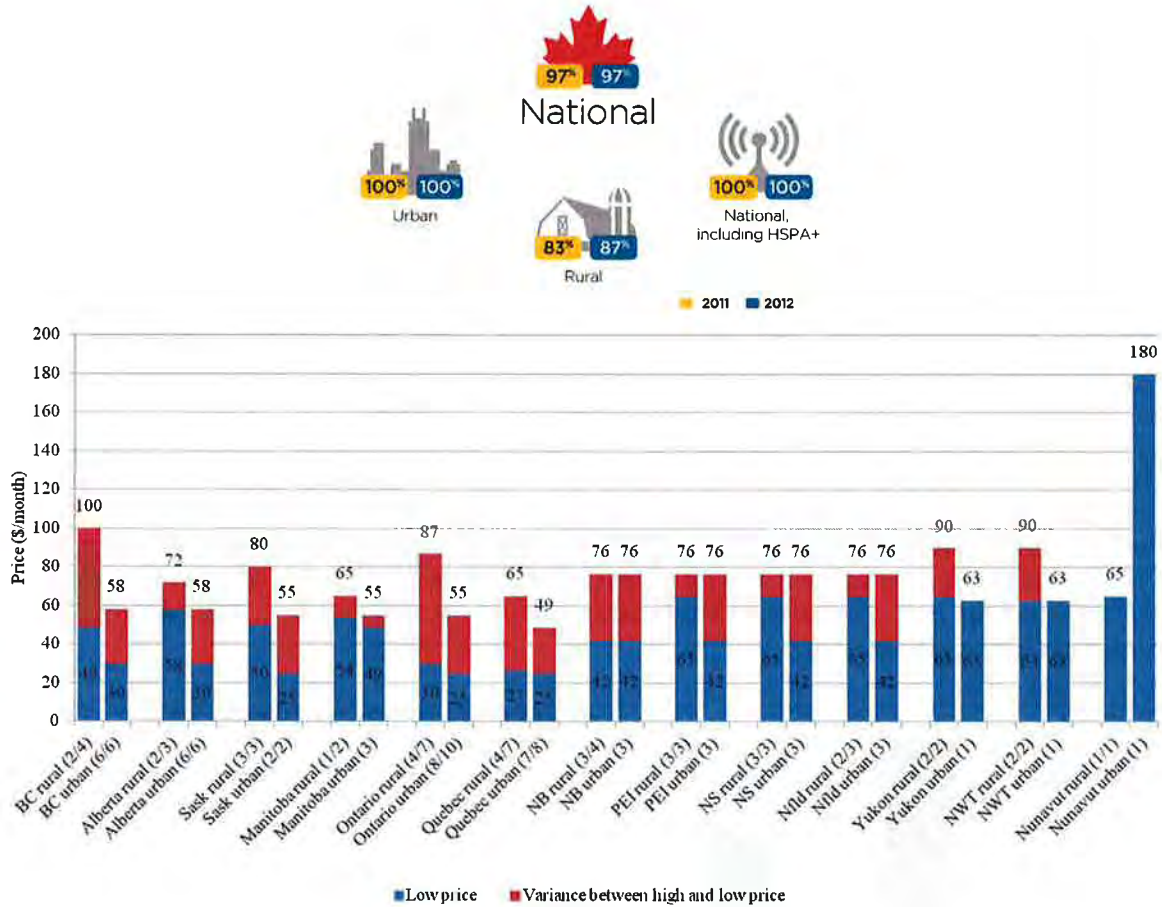
8.2.5　Labour

With increasing automation and the realignment of how companies create value in knowledge-based economies, the make-up of Canada's labour force is changing. Since 1975, labour's share of the national income has declined 1.73%.[8]

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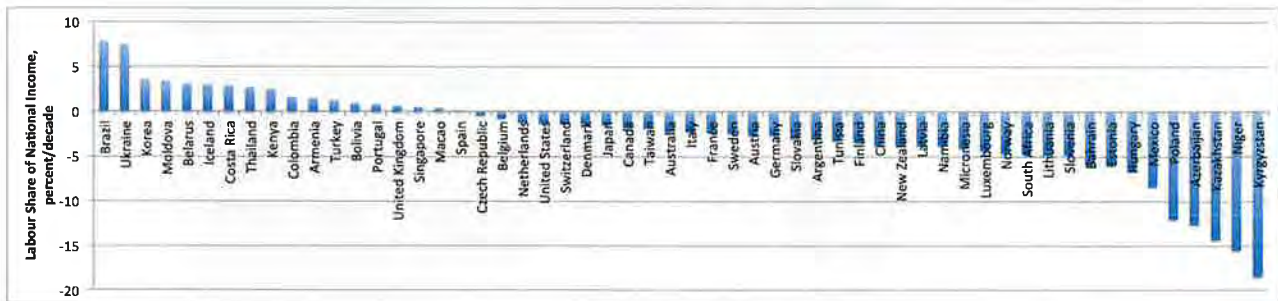
[77] CRTC; CRTC' Communications Monitoring Report; CRTC; 2015-10

While the 'hollowing out' of the middle class is not as evident in Canada as it is in the US, the number of medium and low skilled jobs is declining relative to those requiring higher skill levels.[78] From both the perspective of retraining the folks displaced and creating higher skilled jobs for them, broadband is key.

Perhaps more distressing is that with the developments in both robotics and deep learning, some two-thirds of all jobs are now at risk of being automated.[8]

Estimated share of employment that is susceptible to automation, latest year

Adjusted (technological feasibility + adoption time lags)   ◆ Unadjusted (technological feasibility)
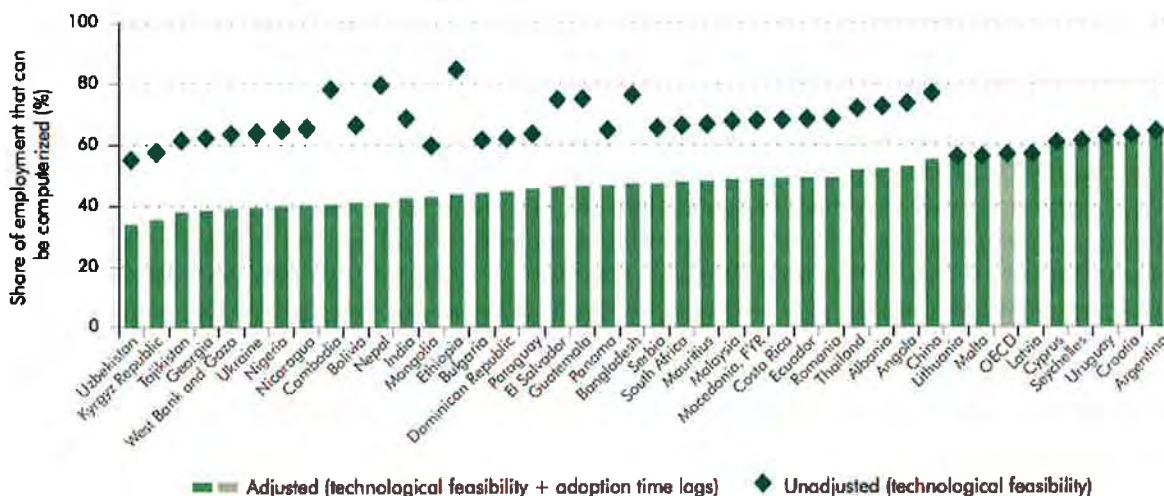
9   Learnings

9.1   Context

Over the past several years, broadband conversations in the province have shifted from *Why is this important?* to *Given this is critical civic infrastructure, how and when can we make it happen?*. I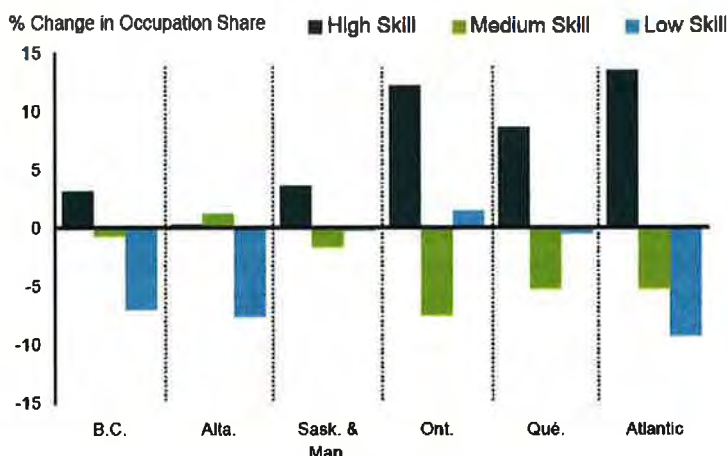n general, the "How" is via the provisioning of fibre-based infrastructure where possible on a utility basis. "When" depends on financing in relation to other civic priorities. Over the past year, both the AUMA and the AAMDC have passed resolutions relating to providing member support for enhancing broadband services throughout their communities. Three key initiatives include the community initiative in Olds, the regional initiative undertaken by AlbertaSW, and the Fibre Strategy adopted by The City of Calgary.

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[78] TD Economics; Are Medium-skilled jobs in Canada Experiencing a Hollowing Out, US Style?; TD Economics – Special Report; 2013-02-26.

9.2 Olds

In the early 2000's, the Town of Olds, The Olds Chamber of Commerce, The Olds Agricultural Society, and Olds College partnered to establish a non-profit community development organization, the Olds Institute for Community and Regional Development (OICRD). The brilliance of the OICRD is that by combining the expertise from the public and private sectors, its activities became inclusive, could be more broadly supported and, without the encumbrances of local election cycles, were better able to take on longer-term projects. Over time, a dozen committees were formed under the auspices of the OICRD, each focused on a different aspect of community development – from community engagement, to business retention, to, well, technology.

Shortly after its inception, the Technology Committee, chaired by Joe Gustafson, settled on the notion of enabling superior broadband throughout the region via the deployment of fibre optic cabling. The idea was that if the OICRD got the fibre in the ground, they could then connect it to the newly created Alberta SuperNet and things would take-off from there. Reality struck quickly:

- Regional fibre estimates for Mountain View County came in shy of $100M. The focus then changed to Olds itself, with the regional option to be re-evaluated later.
- The SuperNet only provided backhaul connectivity (e.g., SuperNet could connect an Old's network to Calgary) but was not established to either light community fibre networks or to provide Internet services over them.

From the SuperNet, the Technology Committee then approached Shaw and TELUS. Shaw declined upfront, but TELUS indicated that should the network be deployed to their specifications, TELUS would consider lighting it and providing services. That did not materialize and they explored potential partnerships. In the end, the Technology Committee undertook to both deploy and light a state-of-the-art fibre network in Olds. When Bell, Navigata, Allstream, and Rogers then also declined to provide services, the OICRD established a wholly owned for-profit subsidiary to develop, provide, and operate a full set of triple-play (Internet, telephone, and television) services over the open, passive, OICRD network under the O-Net brand. In July, 2012, Olds became the first community in Canada with community-wide gigabit per second Internet. Last fall (2015), O-Net became cashflow positive.

O-Net Internet Services:

RUSH	ZOOM	GIG
$90/MO.	$100/MO.	$120/MO.
50 Mbps Download†	100Mbps Download†	1000Mbps Download†
50 Mbps Upload†	100Mbps Upload†	1000Mbps Upload†
500GB Monthly Usage	1TB Monthly Usage	2TB Monthly Usage
Wi-Fi	Wi-Fi	Wi-Fi
2 Email Addresses	2 Email Addresses	2 Email Addresses
Local Support	Local Support	Local Support

The Olds' Connected Community Network (OCCN) illustrates by example how a small town community with a population of ~8,700 people can take ownership of ensuring its businesses and residents have access to global standard IT infrastructure and services as the foundation for their

economic, social, cultural and environmental sustainability. It also demonstrates a potential path that Canada might take to regain its past position in the global telecom space. Modeled on the European services-based competition model, the Olds fibre network is separate from the services company. Established as a largely social enterprise, O-Net is now available to provide similar services to any municipality that is able to deploy lit fibre optic network within their community. Further, the Olds' folks are willing to share their learnings with any community that is interested – as outlined in the following video from the OICRD:

> http://youtu.be/Uc_plnE3W5U

In it, Olds specifically offers to share their experience and expertise with any community interested in enabling state-of-the art fibre-based services within their communities.

It has been said that community fibre endeavours are likely 80% social and 20% technical and the Olds' experience supports this from several perspectives. First, the community-wide inclusive nature of the OICRD enabled coordinated long term planning and broad-based support for projects like the OCCN. It enabled complementary support for key related initiatives such as community engagement. Being leading edge, mistakes were expected and no blame was attached. Issues from rights-of-way to financing were encountered and the cross-disciplinary nature of the OICRD enabled efficient resolution.

9.3 Alberta SouthWest

The Alberta SouthWest Regional Alliance initiated the first regional broadband strategy encompassing the member municipal districts of Pincher Creek, Cardston, Willow Creek, Crowsnest Pass, Ranchland, and Waterton together with the Towns of Claresholm, Fort Macleod, Granum, Nanton, Pincher Creek, and Stavely, and the Villages of Cowley, Glenwood, and Hill Spring. The initial work focused on community engagement, education, and strategy. Once completed, the focus shifted to individual community support. Once completed, the final phase was to refine the regional strategy and facilitate implementation. While well-intended, an unintended consequence of their focus on helping individual members move forward, was that some of their larger members then did so – on their own – to some extent stranding both the smaller members and inhibiting a more regional approach. Axia's concurrent offer of 'free and hassle-free fibre' to communities in the Region that could show 30% of their addressable premises interested in Axia services simply compounded the problem. With the defacto foreclosure of a more regional approach, the regional level work did not proceed to implementation.

Of the communities moving ahead on their own, the current success story is Waterton. Leveraging a Shared Services Canada project to upgrade water facilities throughout the Waterton townsite, the town moved to deploy fibre to every premise in Waterton and now provides a rich set of both fibre and wi-fi based Internet services throughout the town and campground. Now that the TELUS backhaul links have been upgraded to 1 Gb/s, O-Net will begin providing a full triple-play (Internet, Telephone, and Television) portfolio to residential clients when the tourist season begins to wind down this fall.

Perhaps partially in light of their experience, there is a growing recognition of the importance of multi-community scale. Indeed, the sharing of resources and expertise from dense to less dense areas enables a broader deployment of fibre in the areas to be served. Earlier this year, the Alberta Government introduced a new grants program aimed at facilitating regional scale planning-level broadband studies. Under the program, matching grants of up to $20 000 are made available to interested Regional Economic Development Alliances (REDAs). Applications are due by September 1st, 2016 and the work must be completed by March 31st, 2017.

9.4 City of Calgary

Please see Sec. 6.3 – Connectivity vs Broadband.

10 Provincial Context[79]

10.1 SuperNet

The Alberta SuperNet is a broadband superhighway, conceived by the Government of Alberta (GoA) in the early 2000's to connect public institutions, collectively termed the GLHLM (GoA, Learning, Health, Library, and Municipality) clients, to a broadband network for high-speed Internet access, video conferencing and other services. It also enables rural Internet Service Providers (ISPs) to connect their access networks back to a peering point in Edmonton and Calgary at reasonable cost. The SuperNet links 4,200 GLHLM facilities in 429 communities and brings affordable high-speed network access options to nearly the entire province. A map of the SuperNet appears on the next page. While it mostly consists of fibre-optic backbone facilities, wireless links are used to complete the network in the most rural areas.

The Alberta SuperNet consists of the Bell-operated Base Area Network (BAN), shown in green and serving 27 of the larger urban centres, and the Axia-operated Extended Area Network (EAN), covering the rest of the province – shown in blue. The 27 Bell-operated base area network communities are:

Airdrie	Drumheller	Leduc	Sherwood Park	Vegreville
Bonnyville	Edmonton	Lethbridge	Spruce Grove	Vermilion
Brooks	Fort McMurray	Lloydminister	St Albert	Wainwright
Calgary	Grande Prairie	Medicine Hat	Stony Plain	Wetaskiwin
Camrose	High River	Red Deer	Strathmore	Whitecourt
Cold Lake	Lacombe			

As the SuperNet is operated on an open access basis (its services are available to all service providers on a comparable basis), to preclude any conflicts of interest, neither Bell nor Axia can offer retail services such as Internet within their SuperNet footprint. To date, Bell does not offer retail services within the province, but Axia NetMedia does provide retail services to corporate clients and, through Axia Connect, provides retail Internet services in smaller communities.

Though Bell was contracted to build the SuperNet, Bell did subcontract the construction of the EAN to Axia. As issues arose as the initial EAN segment was deployed, however, the subcontract was revoked, and remainder of the EAN was deployed by Bell. In return for operating the network free of charge for the first ten years of the SuperNet contract, Bell received full ownership of the BAN. Ownership of the EAN portion of the SuperNet depends on whether a legal or financial perspective is taken. In essence, Bell owns the EAN, but the GoA has an indefeasible right-of-use (IRU) covering the asset and retains the option to buy it back for $1 when the IRU expires in 2035. Should the Government exercise this right, though, it will end up with a set on non-contiguous network segments – as all EAN segments home on the BAN (see the blue vs green segments on the map). In other words, the BAN assets are required to connect the EAN segments together and provide a usable network.

Operationally, the EAN interconnects with the BAN at 27 locations. While Bell has the overall operations and maintenance contract with the GoA, Bell has subcontracted the operations and maintenance of the EAN portion to Axia. As all these operating agreements expire at midnight, June 30, 2018, Services Alberta is currently considering whether to renew the Axia and Bell contracts "as is",

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[79] Government of Alberta; Harnessing the SuperNet Advantage.

update the terms, or possibly sign operating agreements with other providers. Interestingly, Axia has stated that its Axia Connect activities are contingent upon retaining the SuperNet operating contract.

10.2 Rural Economic Development Action Plan

Over the 2014-15 period, the GoA developed a Rural Economic Development Action Plan focused on ensuring the ongoing success of rural economies across the province. The resulting five focus areas are:[80]

1. ***Industry and Business Development***

    -   Enhance the capacity in rural Alberta to establish and grow innovative, next-generation and value-added industries.
    -   Assist rural businesses with capitalizing on opportunities in new local, domestic and international markets.
    -   Increase tourism and culture-based business opportunities in rural communities.

2. ***Financial and Capital Access***

    -   Improve access to capital for rural entrepreneurs and businesses.

3. ***Attraction, Retention and Entrepreneurial Development***

    -   Implement policies and programs that attract and retain families, skilled workers, new graduates, immigrants and Aboriginal people to rural Alberta.
    -   Expand business coaching services that help connect emerging and established entrepreneurs and business leaders through mentorship, leadership and skill development programs.

4. ***Rural Business Infrastructure Capacity***

    -   Increase the capacity of industry to efficiently capitalize on value-added processing and manufacturing opportunities.
    -   Enhance innovation and technology infrastructure to ensure rural businesses are positioned to be effective, efficient and competitive.
    -   Create alignment with the Water for Life Action Plan for a sustainable water supply to support economic activity.

5. ***Regional and Cross-Regional Collaboration***

    -   Enable collaboration within and between regions in Alberta to better focus planning, service delivery and project development.

Enhanced broadband infrastructure comes under the second bullet in focus area 4.

10.3 Bow Valley College Regional Stewardship Program

As Calgary and the region's one and only comprehensive community college, under the Alberta Governments Regional Stewardship program, Bow Valley College (BVC) has been assigned responsibility for rural and First Nations post-secondary education across essentially the same footprint as the CRP. BVC serves 1.3 million residents in the Calgary Region - from High River to Cremona and from Lake Louise to Cluny. In the region, BVC operates community campuses in eight centres:

| Airdrie | Calgary | Chestermere/ | High River |
| Banff | Canmore | Strathmore | Okotoks |

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[80] Alberta Agriculture and Rural Development; Rural Economic Development Action Plan – An Economic pathway for rural Alberta; Government of Alberta; 2015

Cochrane
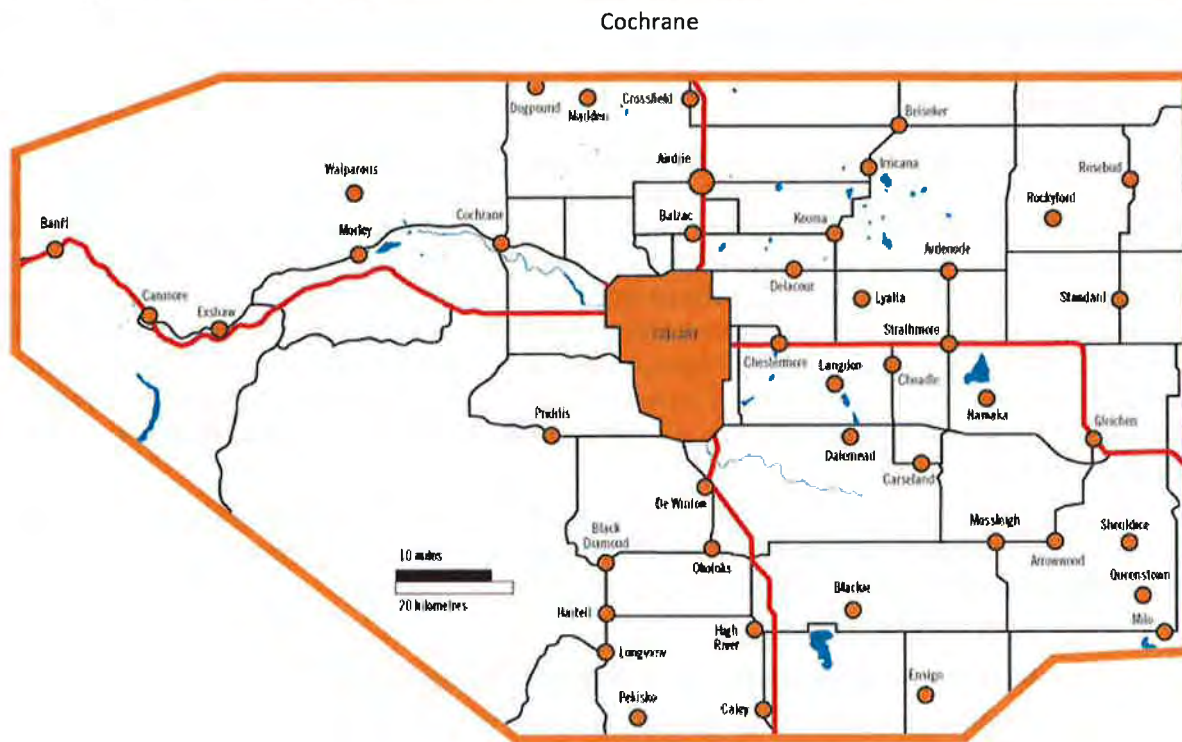
From Canmore to Strathmore, BVC's Regional Stewardship program partners with local employers and community organizations to offer a range of locally-delivered services. The demand-driven/market-pull approach adopted by the BVC is both unique and successful – offered classes tend to fill up quickly.

Enhanced broadband both to its community campuses and throughout the region is critical for the ongoing success and growth of the program, to say nothing of the student benefits that will ensue.

10.4 Alberta Economic Framework

Released in June, 2014, the Alberta Economic Framework sets out create a *framework within which all those whose work impacts economic development might be inspired to work together as one team, with one vision.* [81] Four focus areas are laid out:

- Expand Alberta's presence and role in the global marketplace
- Solidify Alberta as a world centre for resource- based and resource-related industries
- Foster clusters that offer high growth potential to broaden Alberta's economic base
- Inspire entrepreneurs to innovate, commercialize and expand businesses across the province

As a meta-technology, ICT-related technologies impact all aspects of the economy and from that perspective capable ICT infrastructure will fundamentally underpin success in each focus area.

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[81] Alberta Innovation and Advanced Education; Building on Alberta's Strengths; Government of Alberta; 2014-06

11 Why Not Go Wireless?

11.1 Context

Given both the expense and complexity of deploying a fibre network, the question of 'why bother' comes up. After all, with wireless bandwidths constantly improving, surely the fibre will become irrelevant. The easy answer is that wireless Internet networks on any scale do not exist, only wireless Internet access does. That is, while wireless links are often used to connect your smart phone, iPad, or premise to the network, the underlying network that the devices connect to is fully wired. Over the past few years, TELUS has regularly announced billions of dollars in fibre network enhancements to it network in Alberta. Except for its more recent announcement to fibre Edmonton, virtually the entire amounts were earmarked for fibre to its mobility-towers – fibre required to increase the 'wireless' access capacity available to mobile devices. A corollary might be that from David Clark at MIT, i.e., *'the future of wireless'*, is wired.

Given buried fibre deployment costs typically account for some 70% of required capital, wireless access does have a role to play, particularly in more rural areas. But there are trade-offs. First, though, note that wireless access systems come in four flavours:

- Point-to-point wireless links
- Mobility / cellular networks offered by TELUS/Bell and Rogers.
- Point-to-multi-point (PMP) wireless networks typified by the offerings of XplorNet, CCI, and others.
- Wi-Fi Networks such as those deployed in the homes, offices, many commercial establishments, and throughout some municipal areas

Point-to-point (PTP) wireless networks connect two locations together using aligned dedicated high gain antennas. Current systems will do 1 Gb/s bi-directionally. Reliability is affected by weather and distances are typically limited to under 20 km/link.

Mobility networks need no explanation. Coverage by the major providers is extensive, but typically confined to urban/community centres and transportation corridors. Bandwidths are improving (2G, 3G, 4G, and LTE), but as data services get expensive when streaming audio and video media, they tend to be impractical for most home environments.

Widely deployed in rural areas, PMP wireless access networks provide services off a typically tower mounted centrally located access point (AP) to client subscriber modules (SMs) installed at client premises. Bandwidth from the AP is shared amongst those using the same AP. Moving from an omnidirectional antenna to a cluster of more directional antennas, like that shown in the diagram (courtesy of Vitel), effectively multiplies the available bandwidth by the number of sector antennas deployed. In the diagram, CMM refers to the cluster management module or controller and the SS units are surge suppressors needed to obviate impact from lightning strikes. Data signals within the home are wirelessly distributed via an indoor Wi-Fi system.
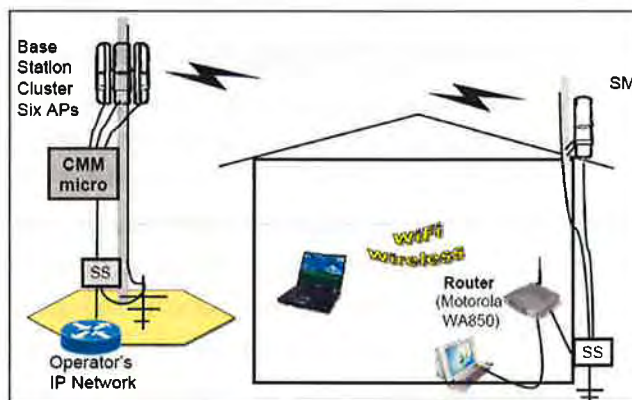
Available bandwidth and quality of service (QoS) in PMP systems depends on the radio equipment and frequencies selected, design considerations such as range of the SM from the AP, and operational

practices of the operator. Advantages include low capital outlay, short deployment intervals, and range. A single AP might serve clients up to 10 km away. Disadvantages include limited shared bandwidth, limited scalability, and the need for specialized SMs, which may need to be mounted on towers erected at the client site. While operators can elect to operate at lower frequencies to increase coverage areas, lower frequencies support less bandwidth.

To some extent piggy-backing on the advances in mobility networks, fixed LTE equipment has increased aggregate bit rates off PMP APs to 100 Mb/s per sector antenna, and up to 12 sectors with a coverage range of some 25km is possible. As 100 Mb/s is aggregate, the capacity is typically split in to downstream/upstream bandwidths depending on usage patterns. Splits of 75/25 are typical. To extend coverage to truly rural areas, PTP wireless links are used to relay signals back to the AP that are connected to network. Providing fibre to a tower can significantly improve available bandwidths available on each subtending AP.

Wi-Fi networks are, in essence, small, localized PMP systems in which the SMs are replaced by the user devices directly. Largely designed for work in-place situations, wi-fi access provides a convenient extension of a premises' wired connectivity connection. Unlike their indoor counterparts, outdoor units used to provide community-wide services are environmentally hardened to withstand cold temperatures and moisture, output ten times the power, and can be meshed or linked together to provide their

Investment per Mbps

own backhaul connections to perhaps the one unit that is 'hard-wired' to a backbone network such as the SuperNet. The issue with larger scale deployments, though, is the 'meshing penalty', i.e., the more access points required to relay signals, the less bandwidth that is available for connecting devices. Bandwidths typically decrease by half with each additional AP that is added to the mesh.
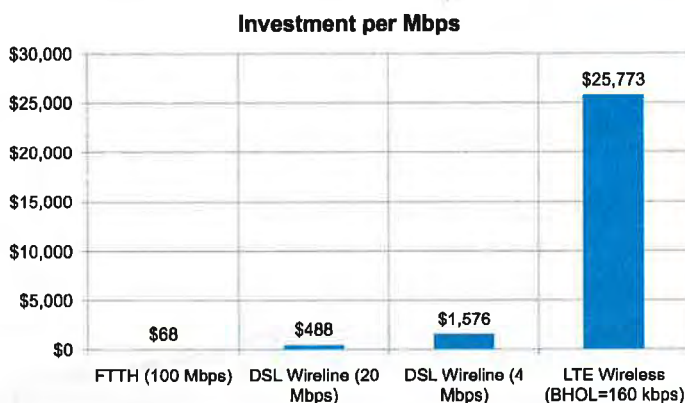
11.2 Trade-offs

Though wireless systems can be deployed quickly and, relative to burying fibre, much less expensively, they are more operationally intensive and, when normalized to bandwidth offered, are significantly more expensive.[82]

As mentioned in Subsec. 5.1.2, a sample design for a 200 mi^2 rural area in Chamberlain, S.D., Vantage Point Consulting found that whereas the least expensive wireless deployment came in at $370 per Mb/s per client, fibre came in at US$7 – and fibre scales but wireless does not.[31] In this comparison, the wireless network was designed to support 4 Mb/s per client whereas the fibre network could support 1 Gb/s.
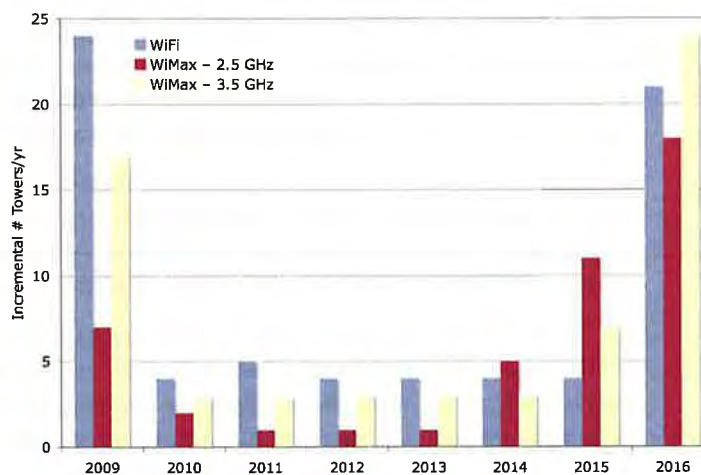
[82] Thompson, L., Highly Deng FTTH Deployments; VantagePoint Consulting; BB Properies Summit; 2011-04-27.

As illustrated in the chart from a Taylor Warwick study a few years ago, scaling wireless systems eventually requires significant increases in a providers' tower density. The associated costs place a fairly hard limit on the overall bit rates that can be delivered. Based on this, potential solutions should be compared on a total cost of ownership basis over, say a ten year period during which the proposed networks are scaled to meeting all projected bandwidth requirements. On this basis, in many cases, the fibre solution will turn out to be the least expensive.

12 Why Not Just Leave Broadband to the Incumbents?

12.1 Historically

Based on historically limited electronics functionality (indeed, electronics did not even exist during the advent of telecom systems), two very different service-specific network infrastructures were developed and deployed:

- ***Telephony Network:*** A twisted pair copper-based centrally circuit switched (dedicated physical circuits) narrow-band (64 kb/s) symmetric (two-way) network to support POTS (plain old telephone services). Because dedicated circuits are established between every two parties that wish to talk, all voice data travels unencumbered between the two parties on each call.
- ***Cable Television Network:*** A coaxial cable-based non-switched (every endpoint receives the same signal) or shared wide-band (initially ~300 MHz) signal consisting of many television channels. In this case, it was the end-user device (TV) that selected the desired channel.

Given the expense of deploying their single-purpose networks, the telecom and cable incumbents were each granted monopoly status so that their network investments could be recouped over long amortization periods. In return, and to ensure they did not abuse the privilege, all services offered off the networks were regulated by the CRTC. With service revenues regulated, the incumbents sought to control their network costs by maintaining tight control over all services utilizing their networks' resources. As a result, incumbents became vertically integrated across their network and service operations.

12.2 Vertical Integration

The delivery of telecommunication services requires the three functional components illustrated in the next figure. On the left, is the passive network piece comprising the connectivity infrastructure. It consists of all the ducts, copper, fibre, hand-holes, and coaxial cabling required to connect sites together. Once the network electronics are added, information signals and data can be exchanged between communicating sites – and the network becomes functional. The service electronics depicted on the right, provide the Internet, television, and telephone services that businesses and consumers pay for. The service rates charged are high enough to cover the costs of the underlying network.

The unabated progress in integrated electronics over the past 52 years has led, based on Moore's Law, to the 34.4 billion-fold improvement in capabilities that has powered the development of the digital age. The ramifications are everywhere – from the convergence of media to the development of personal computers and the proliferation of devices of all sorts – Future Shop did not exist in 1964.

Over time, network support to enable digital communication between many of these new devices – from point-of-sale terminals, access to time-shared computers, and so on – became necessary and the carriers began to meet these needs by enabling access to a novel academically-based data network called the Internet. As demand for Internet grew, telephony networks were adapted to support wider-band signals and two-way and switching (routing) capabilities were added to cable networks. Adaptations on both networks had their limitations, however, and as the number of services requiring

support proliferated, it became impractical to either deploy a dedicated network to support each service or to even provide dedicated circuits for each service on a single network. The answer lay in the development of a single shared bi-directional routed digital broadband network infrastructure capable of transporting all current and reasonably envisioned services. The most capable of these required access to an underlying fibre optic network.

TELUS / Bell / Shaw / Rogers / WISPs
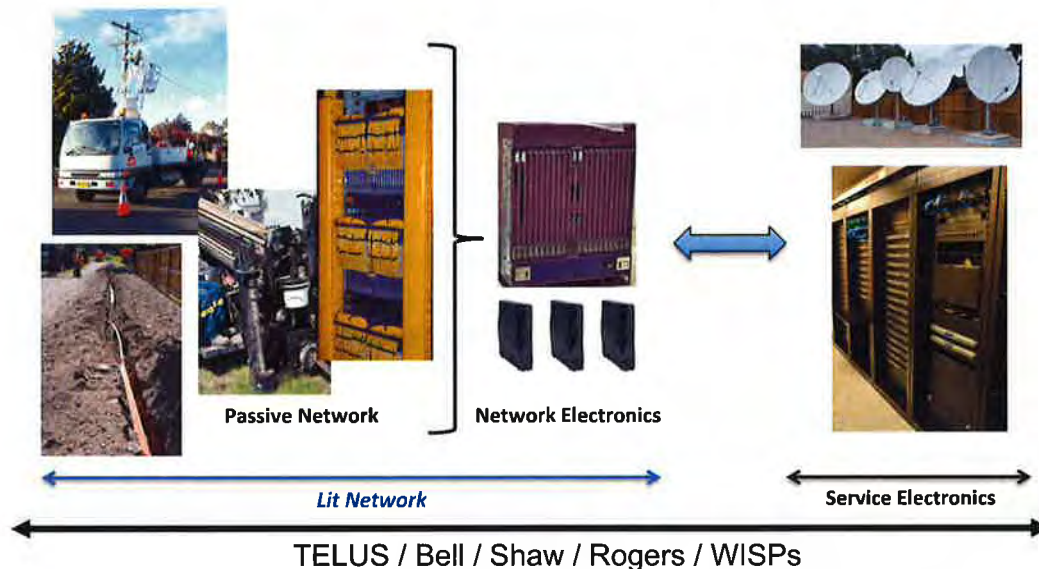
12.3 The Upgrade Issue

As the business case for incumbent carriers to upgrade their copper or coaxial cable networks to fibre is based on only the incremental revenue the upgrades would enable, the incumbents only elect to upgrade when other factors such reduced maintenance expenses or competitive considerations come in to play. Otherwise, only incremental improvements, such going fibre to the neighbourhood, are deployed. As coaxial cable will intrinsically support higher bit rates than copper, the cable companies are even less inclined to deploy fibre access than the telecom players.
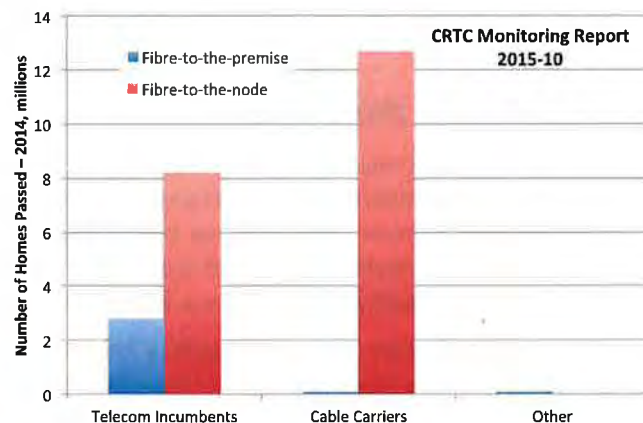
12.4 The Googin Paradox

In helping facilitate the development of this all-purpose network and the Internet, the incumbent's inadvertently opened Pandora's Box. You see, with sufficiently sophisticated end-user devices, Internet enabled a complete bypass, albeit very poorly at first, of the incumbent service sets – with Internet you could do voice-over-IP and Skype, YouTube and Netflix. With sufficiently unencumbered access, you no longer need the incumbent's services.

The Internet broke the age-old service/network linkage and thereby disrupted incumbent control of their networks and directly threatened their revenue streams. Adding fibre simply made everything worse – and led to Googin's Perfect Network Paradox:

> **The better the network, the lower the profit. 'Telecom is either a valuable monopoly or a valueless commodity.' – R. Googin**

In the limit, this logic suggests that a theoretically perfect all-optical network – offering infinite bandwidth, reliability, low latency and protocol neutrality – while greatly enriching society, would bankrupt any network provider 'foolish' enough to deploy it; i.e., with open high bandwidth transparent networks, services can be developed and deployed with no telecom incumbent involvement outside of Internet services – and therefore reduced revenue streams.

The incumbents' then, face an interesting conundrum:

- **Don't deploy** the 'perfect' network because you can't profit from it and may go bankrupt in the process – at a minimum your share price will drop.
- **Do deploy** the 'perfect' network, but restrict it such that you can maintain control and profit from it: i.e., maintain network control, ration bandwidth, and lobby against net neutrality.

If the incumbents owned the road/highway system, this would be paramount to installing toll gates and enforcing usage charges based on deep inspection of each vehicle's content (value).

The predicable result, then, is that instead of the open, symmetric, high bandwidth (100+ Mb/s) networks required to stimulate/catalyze innovation and economic development in Alberta (and increasingly available elsewhere), we have asymmetric low bandwidth (typically < 10 Mb/s downstream) gated (closed, controlled) networks, optimized for content delivery (i.e., video broadcast) and the maintenance of the incumbent operators' historical business models. In the transportation industry, this is paramount to the automotive manufacturers owning the roads their cars drive on. To develop a and sell a new car, you'd have to deploy your road network first. Moving from low asymmetric to high symmetric bit rates enables a new service paradigm and a plethora of new service possibilities

12.5 Beating the Paradox

In summary, the stall in fibre deployment is fundamentally an agency issue – a conflict between corporate stakeholders and the interests of the communities they serve, investor ROI vs regional economic development. The issue has been recognized around the world and a variety of approaches in varying stages of deployment are in currently in play. The challenge, then, is to collectively customize what's worked elsewhere and create a 'Made in Canada' solution that benefits us all.

The good news is that the agency issue is an offshoot the traditional business model in which services and the networks on which they run are tightly coupled. The better news, is that if you change the business model – the issue disappears. The best news is that, as has been empirically in Europe, the solution is structural separation between the network (passive + network electronics) and the services that run over it; i.e.: you run the network as a utility and enable full competition at the service level just as the power grid is provisioned on a utility basis that enables full competition amongst the appliance providers. To work, the network must be operated on an open nondiscriminatory basis that enables full services competition on a level playing field.

Needless to say, the incumbents prefer the current vertically integrated facilities-based competition model as it effectively limits services-based competition and preserves their defacto monopoly; i.e., to compete in services, a would-be competitor has to build a network first. With structural

separation and services-based competition sharing a utility fibre network, any smart teenager with a server in his (her) basement can develop services that can be run over the utility network infrastructure.

From both competitive and innovation perspectives, the results of services-based competition are striking:

- In the 60 000 home community of Västerås, Sweden this approach yielded true broadband (fibre) infrastructure with 30 service providers offering 110 different services and take-rates are over 50%
- In Alberta, there are two wireline competitors and only a handful of service options.

With services-based competition, communities seeking to deploy fibre as a utility are not competing with private enterprise, they are facilitating it.

12.6 Infrastructure

Given the incremental nature of the business case incumbents face to upgrade their networks, the conflict between their shareholder interests and those of the communities they serve, and their desire to maintain facilities-based model, precious few communities are likely to see fibre access deployed by the incumbents any time soon. On the other hand, given the many positive off-balance sheet benefits enabled by fibre and access to long term infrastructure financing, communities are well positioned to deploy fibre on a utility basis – and can thereby enable fibre services at rates simply unavailable to the incumbent providers.

Consider a rural example. At two farms per mile and $30/m deployment cost, a $1 M fibre build would pass 50 farms with little left over for the drop and electronics. Whereas a private operator financing this would require payback in five years, a community could finance the build over 20 or 30 years. The difference is significant. Whereas a five year payback at 5% requires payments of $18,871/month, over a 20 year term from the Alberta Capital Finance Authority, a 2.766% loan requires payments of only $5,430/month. In the utility infrastructure game, private industry cannot compete with communities.

12.7 Private Sector Players

12.7.1 Axia

In return for access to a Town's rights-of-way, Axia is offering to deploy fibre infrastructure throughout the town and provide residential and business Internet connectivity at rates up to 100 and 1000 Mb/s, respectively, should 30% of the addressable premises in the community show interest in these services. Offers are contingent on due diligence by Axia and Axia may or may not agree to 'fibre' any individual community.

While merits of an essentially hassle-free and free, FTTP infrastructure are self-evident, the offer is neither without cost nor risk. All revenues from the network would accrue to Axia's shareholders and once deployed, Axia would have monopoly control over critical civic infrastructure. No infrastructure would be deployed into the surrounding MD or county and the network would not be open in the traditional sense of the term.

To date, Axia has deployed fibre in Vulcan, Nanton, and Nobleford. Communities such as Raymond, Glenwood, and Pincher Creek have approached Axia but have not yet received go/no-go decisions. Communities such as Black Diamond and Turner Valley in the Calgary region have opted to delay decisions relative to Axia until a regional study (the CRP study in their case) has been completed.

Service pricing on a two year contract appears below.

25 Mbps	**50** Mbps	**100** Mbps
$59/mo	$79/mo	$99/mo
Residential Pricing		

25 Mbps	**50** Mbps	**100** Mbps	**1** Gbps
$99/mo	$199/mo	$299/mo	$599/mo
Business Pricing			

12.7.2 Bell Canada

Bell Canada has recently shown renewed interest in providing broadband services in Alberta.

12.7.3 CCI Wireless

Though currently solely a wireless ISP, CCI is looking to develop 50/50 PPP arrangements to deploy fibre in communities such as Caroline.

12.7.4 Shaw

Shaw wholesales has been very aggressive/competitive with respect to providing backhaul services throughout the province.

12.7.5 TELUS

Until 2015, TELUS was actively signing up communities interested in obtaining upgraded TELUS Internet services. The details remain confidential, but Ponoka, Innisfail, Drayton Valley, Didsbury, and likely a few others signed up. While TELUS did deploy fibre in at least Innisfail and Didsbury, they did not then offer those communities any services over and above what they offered elsewhere. Those who thought they would be receiving Gb/s services like those available in Olds were disappointed.

Seemingly in contrast to these initiatives, TELUS has since withdrawn developer support for infrastructure of any kind in new subdivisions. Based on this, it is likely that the above program has been discontinued.

Over the next six years, TELUS plans to spend $1 billion to deploy fibre throughout Edmonton.

13 Next Steps

As mentioned early on, this CRP project has been broken into two parts – (1) Landscape Issues, (2) Municipal and Regional Opportunities. As this document is Part 1 of 2 and focuses on the landscape Issues and context, the next step will be to complete Part 2.

14 Conclusions

- Economic development is not a zero-sum game in which the winning community takes all. Together, the CRP members and non-members can raise the 'tide' throughout the region so that all can benefit.
- The municipalities, municipal districts, and counties can accomplish more together than separately.
- Scalable broadband connectivity is critical civic utility infrastructure and should be treated as such. In the US, 25 of the 48 states reporting have a broadband office.

- Federally, the CRTC universal service options are inhibited by the facilities-based framework under which they operate. Moving to a services-based framework in which the required underlying fibre infrastructure is provided on an open basis as a fourth utility over which all providers can compete on services would enable ubiquitous deployment and help eliminate the existing digital divide. Under this model, private providers would get access to infrastructure superior to that which they themselves could afford to deploy and could then re-direct the capital saved to innovate and compete on services.
- As municipalities and regions can fund fibre infrastructure over 20+ year periods, they can provide the infrastructure much less expensively than can a private interest firm intent on recouping its capital in, say, five years. Monthly payments by a community on a $1M infrastructure loan over 20 years at 2.602% from the Alberta Capital Finance Authority (ACFA) are $5,349 versus the $18,417/month payments required of a private firm paying 4% on the same amount over a five year term.
- Both federally and provincially, funding and debt limit policies need to be updated to help enable municipalities to deploy the required infrastructure.
- As the required infrastructure upgrades represent a once in a century opportunity, it is worth getting this right.

15 Acronyms

ABF	air blown fibre
ACFA	Alberta Capital Finance Authority
ADSL	asymmetric DSL
AESO	Alberta Electrical System Operator
API	application programming interface
AUC	Alberta Utilities Commission
BAN	base area network
BCG	Boston Consulting Group
BVC	Bow Valley College
CAD$	Canadian dollars
CAGR	cumulative annual growth rate
CRP	Calgary Regional Partnership
CRTC	Canadian Radio-television and Telecommunications Commission
DARPA	Defense Advanced Research Projects Agency (US)
DIY	do-it-yourself
DOCSIS	data over cable systems interface standard
DSL	digital subscriber line
ERaCha	Edge of Radial Change
FDH	fibre distribution hub
FTTH/FTTP	fibre to the home/premise
GB	gigabyte, where 1 B = 8 bits (b)
Gb/s	gigabits (10^9 bits) per second (1000 Mb/s)
GDP	gross domestic product

G.fast	G.970x standard fast access to subscriber terminals
GLHLM	GoA, Learning, Health, Library, and Municipality
GoA	Government of Alberta
GPON	gigabit passive optical network
HD	high definition
HDD	horizontal directional drilling
Hz	Hertz (cycles/second)
ICF	Intelligent Community Forum
ICT	information and communications technology
IoE	Internet of Everything
IaaS	infrastructure as a service
ILSR	Institute for Local Self-Reliance
IRU	indefeasible right-of-use
ISP	Internet service provider
IT	information technology
λ	wavelength
LED	light-emitting diode
LEOS	low earth orbit satellite
LTE	long-term evolution
M	mega, million (10^6)
Mb/s	megabits (10^6 bits) per second
μm	micron, micro-meter; 10^{-6}m
M2M	machine-to-machine
NAP	network access point
NPV	net present value
OCCN	Olds' Connected Community Network
OECD	Organization for Economic Co-operation and Development
OICRD	Olds Institute for Community & Regional Development
ONT	optical network unit
OPGW	optical ground wire
OSP	outside plant
OSLI	Oil Sands Leadership Initiative
QAM	quadrature amplitude modulation
PaaS	platform as a service
PMP	point-to-multipoint
PPP	public-private partnerships
PTP	point-to-point
REDA	regional economic development alliance
RMWB	Rural Municipality of Wood Buffalo
SaaS	software as a service

SD	standard definition (television)
TB	Terabyte where 1 TB = 10^{12} B or 1000 GB
TCCi	The Creative Coast Initiative
TV	television
UHD	ultra-high definition (television – 4k)
US	United States (of America)
VDSL	very high bit-rate DSL
WISP	wireless ISP
XaaS	X as a service, where X can be I (Infrastructure), P (Platform), or S (Software)
yr	year

AGENDA ITEM

PROJECT: Broadband - Request for Proposal - Focused Study Area		
PRESENTATION DATE: November 8, 2016		
DEPARTMENT: Community Services / CPS Division	WRITTEN BY: Ted Hickey	REVIEWED BY: R. Leaf
BUDGET IMPLICATION: ☐ N/A ☒ Funded by Dept. ☐ Reallocation		
LEGISLATIVE DIRECTION: ☐None ☐ Provincial Legislation (cite) ☐ County Bylaw or Policy (cite)		
STRATEGIC PLAN THEME: 1: Managing our Growth 2: Well Governed and Leading Organization 3: Community Well-Being	PRIORITY AREA: 1.1, 1.3, 2.1, 2.2, 3.3	STRATEGIES: 1.2.1, 1.1.3, 1.3.4, 2.1.1, 2.2.1, 2.2.3, 3.3.1
RECOMMENDATION: That Council: 1) Approves the four phase study concept; and, 2) Authorizes Administration to proceed with a Request for Quotation for Phase 1 of Council's broadband study.		

BACKGROUND:

Over the past 18 months Council has undertaken various studies and discussions relating to the role the County might play in relation to enhancing broadband service. Options such as augmenting communication tower space within the County or the County constructing a fibre optic cable network have been explored.

During their July 27, 2016 meeting Council directed:

That Administration proceed with the development of a Request for Proposal for the development a conceptual design, budget and business viability model relating to the construction or installation of communication towers and fibre optic cable to enhance high speed internet access within Clearwater County.

In relation to this motion, staff recommend a four phased approach to studying, assessing and developing the business case and design criteria for a County led broadband initiative. Specifically, the study would involve a Request for Proposal (RFP) relating to the following work:

- Phase 1 – Business viability study – focused study area
- Phase 2 – Business viability study – populated area of County
- Phase 3 – Define service area(s) and scope of project

- Phase 4 – Final Engineering, Budget, Tender document, Contract award

It is staff's view that the RFP process allows the County to identify the desired outcomes associated with each Phase while allowing the technical experts/firms to identify the best means for achieving study outcomes. Staff intend that, while the RFP will be for all four phases of the study, the contract will be structured to allow the County to cancel the contract at the conclusion of any phase of study should Council choose to amend or cancel the study project.

With respect to the Phase1 component, staff recommends that the initial study area be the area between Highway 11 & Highway 12 from Range 8 (Ferrier Acres, Brower Subdivision, Woodlands Estates, etc.) east to the Lacombe/Clearwater boundary. Deliverables to be achieved through the study are:

- Statistically valid survey of resident and business to determine current and anticipated broadband needs and level of financial support for service;
- Business case analysis for wireless, fibre optic or combined fibre/wireless service based on:
  - population densities,
  - topography and geographic features (e.g. wetlands, pipelines, approaches, etc.)
  - anticipated uptake rates based on survey data and industry trends
  - forecast capital costs related to fibre optic network development based on aerial or plowed installation
  - forecast revenue and operational costs based on 3, 5 and 10 year modeling
- Public information meeting
- Final report and presentation to Council

Phase 2 would expand the Phase 1 study criteria into a larger area of the County. Staff currently envision the Phase 2 study area being the deeded land areas of the County east of Range 9 to the Clearwater/Lacombe boundary and Nordegg.

Following its review of the Phase 1 & 2 data and community input, Council would then decide if it wishes to proceed with Phase 3 of the study. It is in Phase 3 that staff anticipates Council deciding on the type of network to be developed (tower, fibre, combination) as well as the area(s) to be serviced, capital financing (e.g. debenture vs reserve financing), construction timelines, corporate structure (e.g. P3, municipal corporation, municipal utility), etc. Phase 3 would also include preliminary engineering design, detailed routing of fibre network or tower location, and capital and operational budget forecasts.

Council's decision to move to Phase 4 would result in preparation of detailed engineering plans, tender documents and decision on project management (e.g. design build, project manager, county build). Upon Council approval the project would proceed through NWTA tendering and contract award processes.

Staff is requesting Council's confirmation of the four phase study concept and authorization to proceed with a Request for Proposal for Phase 1 of the broadband concept study.

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Clearwater County
Councilor and Board Member Remuneration Statement

For the Year of ….2016……

Name of Councilor / Board Member …… EARL GRAHAM ……

Payment Periods

January	February	May	June
March	April	July	August
September	(October)	November	December

Supervision Rate – $550.00 Monthly
Reeve Supervision Rate - $850.00 Monthly

Date	Type of Meeting Attended	First 4 Hours $159.00	Next 4 Hours $126.00	Next 4 Hours $126.00	Regular Council Meeting $288.00	Lunch $16.00	Mileage @ $0.54 / km
Oct 3/16	LIBRARY	✓					22
Oct 4/16	AUMA	✓					~~$5~~
Oct 5/16	AUMA	✓	✓				250
Oct 6/16	AUMA	✓	✓				
Oct 11/16	COUNCIL				✓		92
Oct 11/16	AG SOCIETY			✓			22
Oct 17/16	TRI COUNCIL				✓		92
Oct 18/16	M.A. Interview	✓					92
*Oct 21/16	Westview Lodge						*
Oct 25/16	Council				✓		92
Oct 27/16	LIBRARY BUDGET	✓					22
Oct 28/16	S POG / AUDIT	✓					90
Oct 28/16	CAROLINE AWARDS			✓			22

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Remuneration Calculation

i Westview Mtg @ 79	79.00		
7 Meetings @ $159.00=	1113.00	796	Kms @ $0.54= 429.84
4 Meetings @ $126.00=	504.00		Lunch @ $16.00=
3 Meetings @ $288.00=	864.00		
Supervision=	550.00		
TOTAL=	**3110.00**		**TOTAL= 429.84**

Signature {Councilor / Board Member} _[signature]_

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Clearwater County
Councilor and Board Member Remuneration Statement

For the Year of ....2016......

Name of Councilor / Board Member .....Theresa Laing.................................

Payment Periods

January	February	May	June
March	April	July	August
September	October	November	December

Supervision Rate – $550.00 Monthly
Reeve Supervision Rate - $850.00 Monthly

Date	Type of Meeting Attended	First 4 Hours $159.00	Next 4 Hours $126.00	Next 4 Hours $126.00	Regular Council Meeting $288.00	Lunch $16.00	Mileage @ $0.54 / km
Oct5	AUMA	✓	✓	✓			226
Oct6	AUMA	✓	✓				—
Oct 7	AUMA	✓					226
Oct 7	St Dems Awards		✓				14
Oct 11	Council				✓		14
Oct 12	FCSS	✓					14
Oct 13	MPC	✓	✓				14
Oct 17	Tri Council	✓					14
Oct 18	Minister Prelim Review	✓					14
Oct 20	Heritage Board	✓					14
Oct 25	Council				✓		14

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Remuneration Calculation

8	Meetings @ $159.00=	1272.00 ✓	564	Kms @ $0.54= 304.56 ✓
5	Meetings @ $126.00=	630.00 ✓	0	Lunch @ $16.00= 0
2	Meetings @ $288.00=	576.00 ✓		
	Supervision=	550.00 ✓	Lunch $25.53 } RECEIPTS ON FILE	
	TOTAL=	3028.00	Hotel $589.41 } **TOTAL=** 919.50	

Signature {Councilor / Board Member} ......L Laing......

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Clearwater County
Councilor and Board Member Remuneration Statement

For the Year of ....2016......

Name of Councilor / Board Member ...... *Curt Maki* ....

Payment Periods

January	February	May	June
March	April	July	August
September	(October)	November	December

Supervision Rate – $550.00 Monthly
Reeve Supervision Rate - $850.00 Monthly

Date	Type of Meeting Attended	First 4 Hours $159.00	Next 4 Hours $126.00	Next 4 Hours $126.00	Regular Council Meeting $288.00	Lunch $16.00	Mileage @ $0.54 / km
Oct 3	IDP	✓					70
7	DTHS Awards	✓					—
11	Council				✓		70
13	Knechill meeting	✓					—
14	Zone 2 meeting	✓	✓	✓			—
17	Tri Council	✓	✓				70
18	VIC	✓					70
18	Municipal affairs		✓				—
20	CFCA	✓					110
25	Council				✓		70
28	SPAB	✓					70

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Remuneration Calculation

8	Meetings @ $159.00= 1272.00	530	Kms @ $0.54= 286.20
4	Meetings @ $126.00= 504.00		Lunch @ $16.00=
2	Meetings @ $288.00= 576.00		
	Supervision= 550.00		
	TOTAL= 2902.00		**TOTAL=** 286.20

Signature {Councilor / Board Member} ...... *Curt Maki* ......