
Local Employment Policy Area Agricultural Impact Assessment

April 2019

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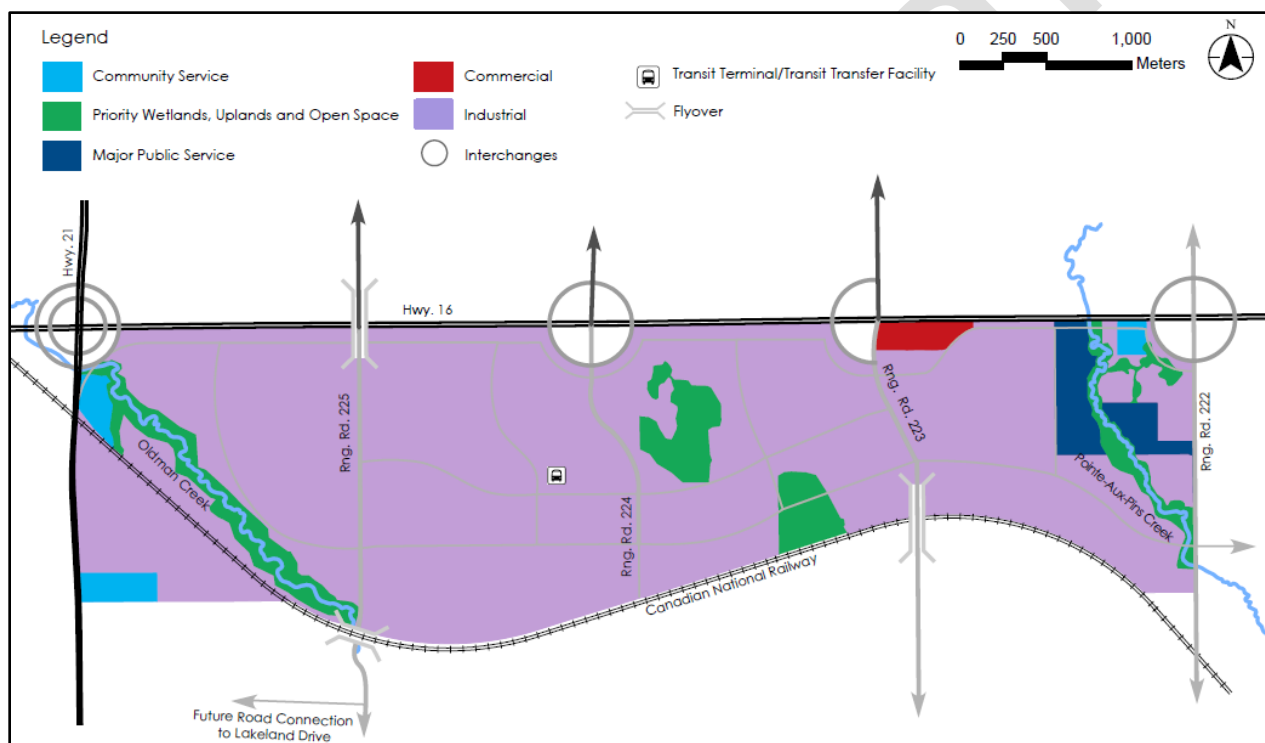
1.0 Executive Summary

The Local Employment Policy Area, herein referred to as LEA, is expected to provide industrial and business employment opportunities for Strathcona County. The area is being planned with the following objectives in mind.

- Provides opportunities for local employment
- Retains the natural landscape
- Is viable over the long term

Figure 1, from the Bremner Area Concept Plan, illustrates the Local Employment Area Concept.

Figure 1: Local Employment Area Development Concept



Source: Bremner and LEA Area Concept Plan, Final Draft, Bylaw 3-2019, April 2019.

Activities such as building transportation networks, installing services like gas, electricity, stormwater management and stripping and grading land for light industrial and business employment will result in the loss of agricultural land observed in Figure 2 below.

Figure 2: LEA Boundary



2.0 Planning and Context

The Local Employment Area was first identified as a potential location for future development as part of the Transition Area Master Plan in 1995, where it was referred to as the Development Expansion Area. Citing development pressures on the land east of Sherwood Park, extending to Range Road 220, east of Ardrossan, the purpose of the Transition Area Master Plan was to provide a framework to guide more detailed land use studies and Area Structure Plans. In 1995, an amendment was made to the 1986 MDP to implement the Transition Area Master Plan.

The 1998 MDP continued to identify the Development Expansion Area and included policies identifying the need to review the Transition Area Master Plan as well as develop Area Structure Plans. The 1998 MDP also directed that a study be undertaken to evaluate the feasibility of four future urban study areas for long term growth, and the Development Expansion Area was identified as part of Future Urban Study Area 3.

In the 2007 MDP, the area was identified as part of the Agriculture Small Holdings Policy Area, but also continued to be recognized as the Development Expansion Area. The 2007 MDP continued to identify that Area Structure Plans were required prior to development. In 2013, the County began work on an Area Concept Plan specifically for the Development Expansion Area. In 2014, the Bremner Growth Management Strategy was completed, and identified proposed access configurations off of Highway 16, which would impact the Development Expansion Area project. Given that a decision on the location of future urban growth had still not been determined; in 2015 the Area Concept Plan was put on hold pending the outcome of that decision.

The 2017 MDP renamed the Development Expansion Area as the Local Employment Area to coincide with the Edmonton Metropolitan Region Growth Plan. By this time a decision from Council had been made to move forward with work on an Area Concept Plan for the Bremner Urban Reserve Policy Area. The Local Employment Area was included within the project scope to ensure planning and technical correlation between the two study areas.

2.1 Applicable Planning Policies and Regulations

2.1.1 Municipal Government Act

The Modernized Municipal Government Act (MMGA) is responsible for providing the operational framework and governance model for all forms of local government in Alberta, including specialized municipalities. It also lays the basis for how municipalities operate, how their councils function and how residents work with their municipality. The MMGA has three main areas of focus:

1. Governance and Administration;
2. Planning and Development; and
3. Assessment and Taxation.

The MMGA enables municipalities to govern the development of lands within their boundaries in a manner that is logical, timely, economical and environmentally responsible. The MMGA requires that municipalities with a population more than 3,500 adopt a Municipal Development Plan. Strathcona County's MDP provides a comprehensive long term land use policy framework that guides present and projected growth and development over the next 20 years and beyond.

2.1.2 Edmonton Metropolitan Region Growth Plan (2017)

The Edmonton Metropolitan Region (EMR) Growth Plan approved in 2017 provides a thirty year plan and a fifty year vision for the region's growth and development. The population of the Edmonton Metropolitan Region is expected to double to 2.2 million by 2044; the growth plan addresses this population increase using the following guiding principles:

1. *Collaborate and coordinate as a Region to manage growth responsibly;*
2. *Promote global economic competitiveness and regional prosperity;*
3. *Recognize and celebrate the diversity of communities and promote an excellent quality of life across the Region;*
4. *Achieve compact growth that optimizes infrastructure investment;*
5. *Ensure effective regional mobility;*
6. *Ensure the wise management of prime agricultural resources; and*
7. *Protect natural living systems and environmental assets.*

In 2017, a new policy area addressing agriculture was added to the EMR growth plan. The plan recognizes future food security issues and the economic value of agriculture in the region while laying out three agricultural objectives:

1. Identify and conserve an adequate supply of prime agricultural lands to provide a secure local food source for future generations;
2. Minimize the fragmentation and conversion of prime agricultural lands for non-agricultural uses; and
3. Promote diversification and value-added agriculture production and plan infrastructure to support the agricultural sector and regional food system.

The plan acknowledged a need for a Regional Agriculture Master Plan that would study and identify specific conservation measures in relation to agricultural lands and industry, this study is currently underway and expected to be complete in the second quarter of 2020.

2.1.3 Strathcona County Municipal Development Plan (2017)

The MDP recognizes the past and future significance of agriculture from cultural and heritage perspectives, as well as its economic importance. Specific goals and policies within the MDP aim to diversify and support agri-business and promote public agriculture in both urban and rural areas.

Under the Local Employment Policy Area, in Section 5.8, under Goal it states the following.

Strathcona County will provide opportunities for Local Employment.

Other policies contained in the Agriculture Large and Small Holdings Policy Areas include ensuring road networks that allows for the safe and timely movement of agricultural equipment and goods in addition to requiring soil conservation and reclamation plans for aggregate extraction operations. Diversifying and supporting small and large agribusiness is also recognized as goals throughout the MDP.

2.1.4 Strathcona County Land Use Bylaw

Most of the land within LEA is currently zoned as Agriculture: General with some smaller areas zoned Highway Commercial, Small Holdings, Conservation, Public Service, Rural Residential/Agriculture and Direct Control. LEA is expected to stay within the Rural Area after the adoption of the Bremner ACP.

2.1.5 Strathcona County Strategic Plan (2018 Update)

Strathcona County's Strategic Plan outlines how the County's activities align to achieve its vision which includes advancing diverse agricultural business and preserving the County's agricultural heritage. This plan directs long term planning and provides the foundations for Strathcona County's corporate and department business plans, sustainability plans and guides annual budget development.

With respect to agriculture, Strathcona County's goal is to provide critical physical and technology infrastructure to enable and stimulate growth and diversify agricultural business.

The Strategic Plan also recognizes that appropriate and effective use of agricultural land ensures effective stewardship of water, land, air and energy resources.

2.1.6 Strathcona County Agriculture Master Plan (2016 Update)

Strathcona County's Agriculture Master Plan was approved in June 2015. The main goals of the plan were to assess the future of agriculture in the County and to identify strategies and policies that would support this desired future.

Included in the Agriculture Master Plan is a requirement for Agricultural Impact Assessments that inform decision making at all levels of the planning process. The Agricultural Impact Assessment addresses a proposed development's effects on existing and future agricultural activities as well as recommends mitigation measures.

The Agricultural Master Plan recognizes that while there are challenges facing agriculture, there are also numerous opportunities for the industry and that without a strong commitment from all stakeholders these opportunities might not be realized. Four planning principals were developed to guide the Master Plan, they are:

- *Supporting Policies – The long term success of agriculture in a metropolitan context can only be assured with strong supporting and integrated land use, food and agriculture sector development and infrastructure policies;*

- *Agriculture Land Conservation – The conversion or fragmentation of large tracks [of agricultural land] primary or unique agriculture lands to non-agricultural uses to accommodate growth (residential, commercial, industrial) will only be done as a last resort;*
- *Shared Leadership – The advancement of agriculture requires shared leadership including the municipality, residents and stakeholders within Strathcona County, and the Capital Region; and*
- *Proactive Agriculture – Changes in agriculture are both continuous and considerable, requiring dynamic and proactive approach in response to emerging trends and opportunities both urban and rural.*

2.2. Biophysical Inventory

2.2.1 Soil Classification

The LEA is located mostly in the Dark Grey – Grey Soil Zone of Alberta. There are two dominant soils located within the subject area: Eluviated Black Chernozems and Orthic Dark Gray Chernozems. Eluviated Black Chernozems in LEA are developed on medium textured till throughout the majority of the subject area and on fine textured water-laid sediments in the northern portion of the subject area. Orthic Dark Gray Chernozemic soils are developed over very fine textured materials and on medium textured till. Gleysols and Organics may be found in low lying areas.

2.2.2 Soil Capability and Land Suitability

The Canadian Land Inventory (CLI) Soil Capability for Agriculture and Canadian Land Suitability Rating System (LSRS) are the two most commonly used systems of agricultural land classification in Alberta. The primary difference between the two systems is that LSRS is crop specific and includes factors like climate and landforms that were not included during the development of the CLI system. LEA contains primarily Class 1 and 2 soils under the CLI classification system which was developed in 1967. Under the LSRS, created in 1995, LEA is classified as Class 2 and 3. The following is a breakdown of the differences between the CLI Soil Capability for Agriculture and LSRS. The 1995 LSRS includes the soil capability from the 1967 CLI but it is crop specific and takes into account factors like climate and landforms which were not included in the older CLI mapping.

Table 1: CLI and LSRS Comparison

Component	CLI [1969]	LSRS [1995]
general	-capability -11 factors -factors not indexed -7 classes -limitation (specified)	-suitability -17 factors -factors indexed -7 classes -limitation (specified)
climate	-frost-free period -annual precipitation	-growing season -moisture index (P-PE) -energy index (EGDD) -modifiers
soils	-structure -salinity -texture -drainage -depth -erosion -fertility -no organic rating -subjective	-structure -salinity, sodicity -texture -drainage -depth -organic matter -soil reaction -organic rating -specific
landscape	-topography -stoniness -inundation	-slope steepness (gradient) -slope length -stoniness -inundation -pattern
scale	1:250K	1:100K in White Area of AB 1:1M in Green Area of AB

Source: Table provided by Candace Vanin with Agriculture and Agri-food Canada.

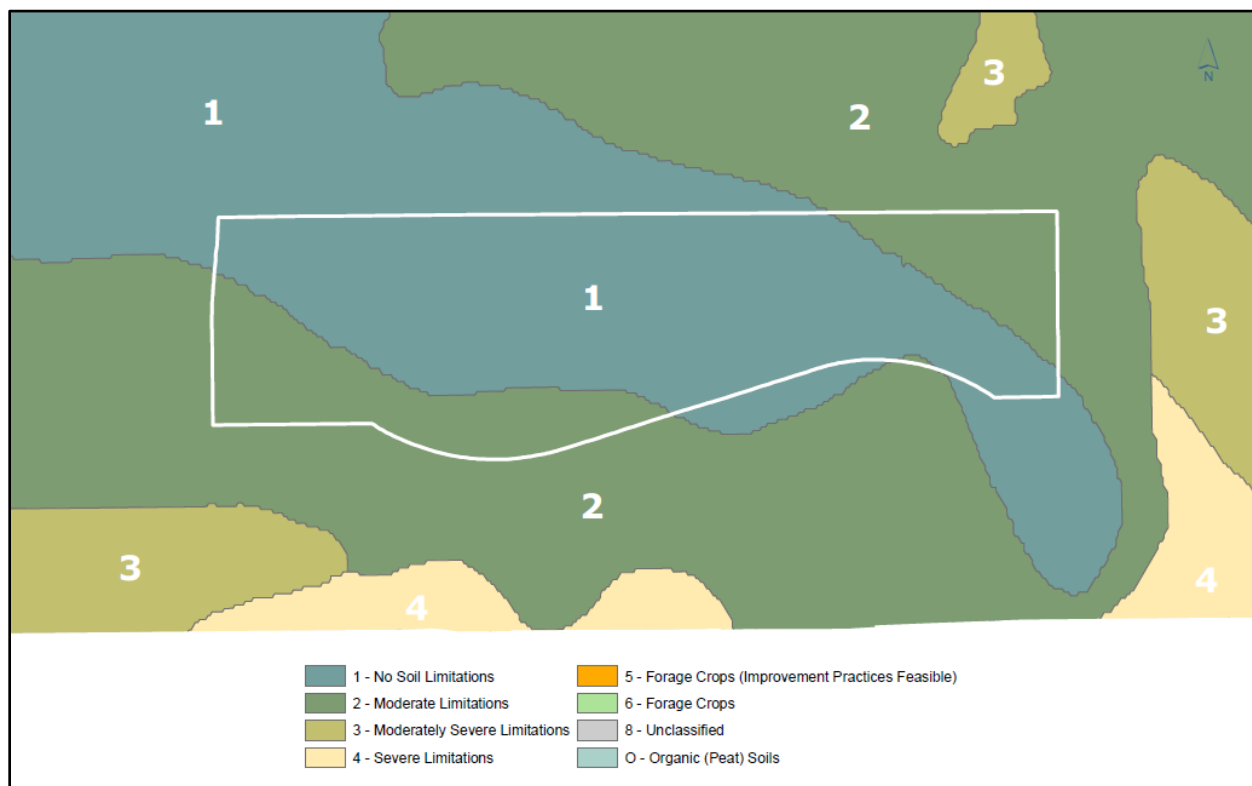
2.2.2.1 Canadian Land Inventory Soil Capability for Agriculture (1967)

LEA contains two classes of soils as per the Canada Land Inventory's Soil Capability for Agriculture maps.

- Class 1 - Soils in this class have no significant limitations in use for crops.
- Class 2 - Soils in this class have moderate limitations that reduce the choice of crops, or require moderate conservation practices.

There is approximately 696 hectares (1,720 acres) of Class 1 soil, 304 hectares (751 acres) of Class 2 soil and within LEA.

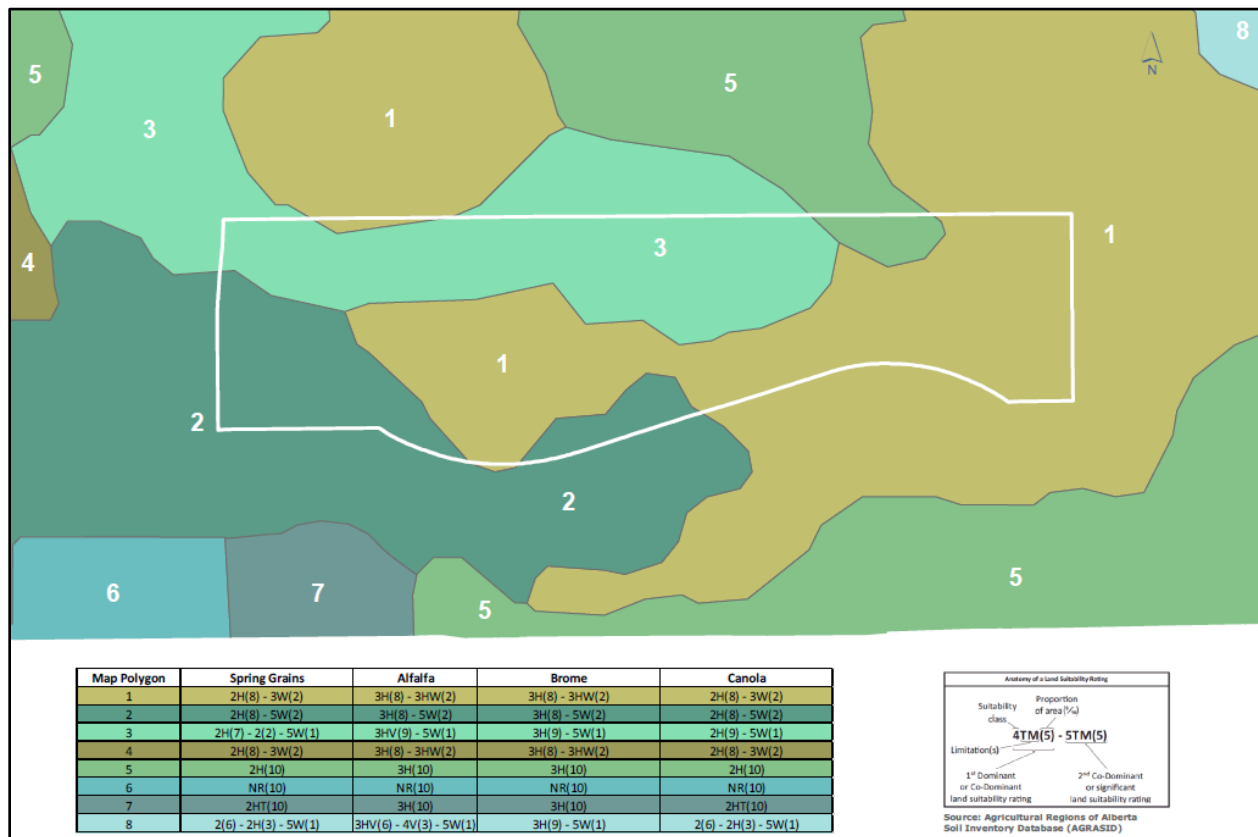
Figure 3: CLI Soil Capability for Agriculture



2.2.2.2 Agriculture and Agri-Food Canada Land Suitability Rating System (1995)

For LEA there are four LSRS maps available for spring-seeded small grains, canola, brome grasses and alfalfa. These maps have been combined and area presented in Figure 4. Lands within LEA are rated as LSRS Class 2 and Class 3.

Figure 4: LSRS for Spring-Seeded Small Grains, Canola, Brome-Timothy Grasses and Alfalfa



The LSRS ratings are interpreted as follows.

Table 2: LSRS Suitability Class

Suitability Class	Index Points	Limitations for specified crop*
1	80 -100	none to slight
2	60 – 79	slight
3	45 – 59	moderate
4	30 – 44	severe
5	20 – 29	very severe
6	10 – 19	extremely severe
7	0 – 9	unsuitable
*Limitations are for production of the specified crops. This does not imply that the land could not be developed for other crops or for other uses.		

Table 3: LSRS Limitations

Temperature (H)	This subclass indicates inadequate heat units for the optimal growth of the specified crops.
Drainage (W)	This subclass indicates soils in which excess water (not due to inundation) limits the production of specified crops. Excess water may result from a high water table or inadequate soil drainage.
Slope (T)	This subclass indicates landscapes with slopes steep enough to incur a risk of water erosion or to limit cultivation.

Table 4: LSRS Degrees of Limitation

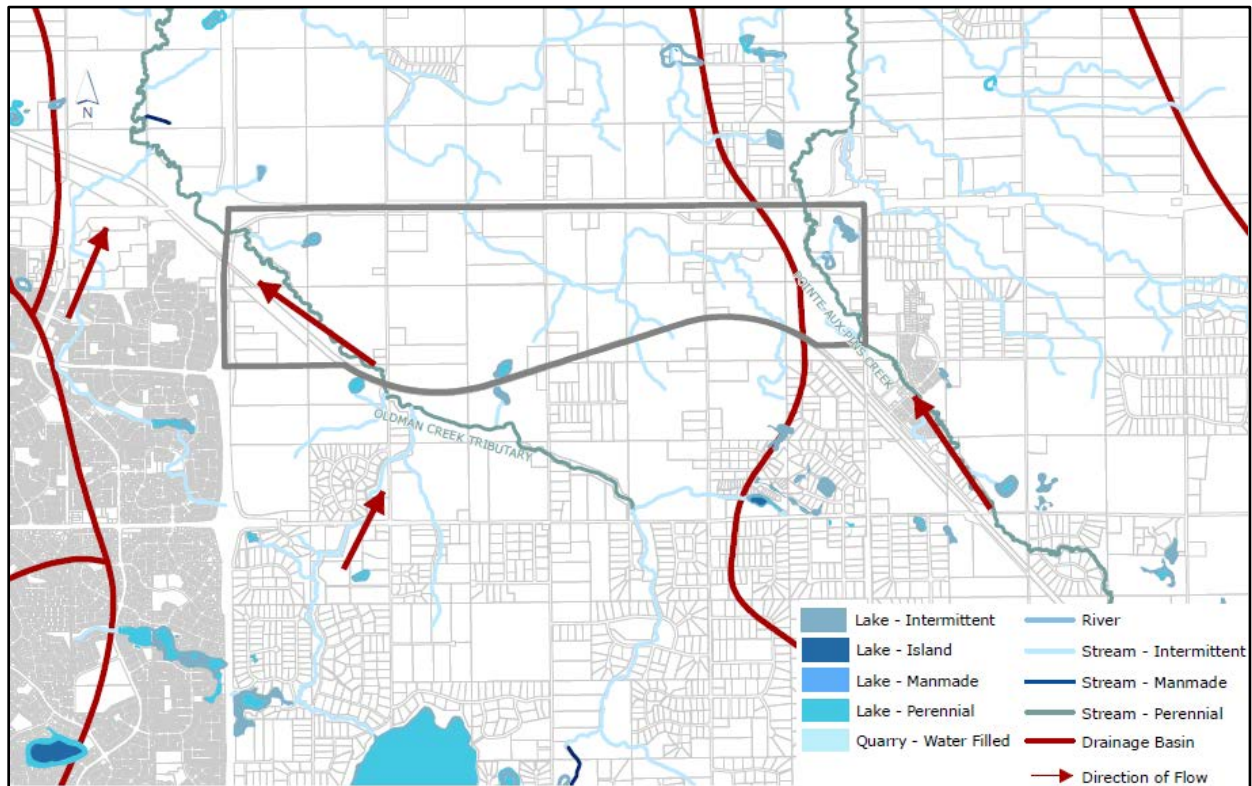
Class 1	Land in this class has no significant limitations for production of the specified crops (80 - 100 index points).
Class 2	Land in this class has slight limitations that may restrict the growth of the specified crops or require modified management practices (60 - 79 index points).
Class 3	Land in this class has moderate limitations that restrict the growth of the specified crops or require special management practices (45 - 59 index points).
Class 4	Land in this class has severe limitations that restrict the growth of the specified crops or require special management practices or both. This class is marginal for sustained production of the specified crops (30 - 44 index points).
Class 5	Land in this class has very severe limitations for sustained production of the specified crops. Annual cultivation using common cropping practices is not recommended (20 - 29 index points).
Class 6	Land in this class has extremely severe limitations for sustained production of the specified crops. Annual cultivation is not recommended even on an occasional basis (10 - 19 index points).
Class 7	Land in this class is not suitable for the production of the specified crops (0 - 9 index points).

2.2.3 Surface Drainage

The surface water drainage in LEA is generally directed towards Oldman Creek and Pointe-Aux-Pins Creek. Approximately 90% of the area exists inside the Oldman Creek drainage basin and 10% of the area is in the Pointe-Aux-Pins drainage basin. Both creeks flow northwesterly into the North Saskatchewan River which is approximately five and a half kilometers downstream of the northwest corner of LEA.

A Drainage Master Plan will be completed for the Bremner ACP that will address appropriate discharge rates into the creeks which should prevent negative effects to agriculture, aggregate extraction and other development downstream of the proposed industrial and business employment development in LEA.

Figure 5: Surface Drainage



2.2.3.1 Drainage Improvements

An online search of Alberta Environment and Parks Authorization Viewer on March 23, 2018 found three approvals for drainage improvements and flood control on wetlands and creeks in LEA. A physical search of Alberta Environment and Parks approval documents was not conducted for the purposes of this report; other authorizations may exist that are not available online.

There may be opportunities to restore the altered wetlands and ephemeral drainage corridors so they may be incorporated into open space areas or stormwater management facilities.

Figure 6: Surface Water Drainage Improvements

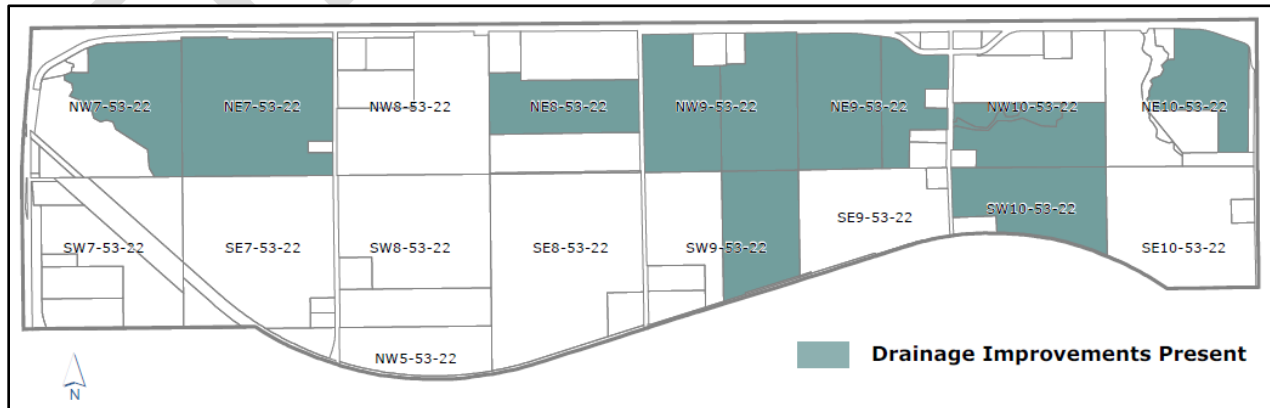


Table 5: Type of Surface Water Drainage Improvement

Location	Type of Surface Water Drainage Improvement (based on historical aerial photo review)
NW 7-53-22 W4	- channelized natural drainage
NE 7-53-22 W4	- channelized natural drainage and dugouts installed
SW 7-53-22 W4	- removal of wetlands and channelized natural drainage, dugout installed
NE 8-53-22 W4	- channelized natural drainage
NW 9-53-22 W4	- channelized natural drainage
NE 9-53-22 W4	- channelized natural drainage, dugout installed
SW 9-53-22 W4	- channelized natural drainage, dugout installed
NW 10-53-22 W4	- channelized natural drainage
NE 10-53-22 W4	- removal of wetlands and channelization of natural drainage
SW 10-53-22 W4	- channelized natural drainage, dugout installed

2.2.4 Groundwater and Irrigation

As per the Regional Ground Water Assessment (2001), groundwater in LEA comes mainly from the Bearpaw aquifer which is generally 80 to 100 meters thick and less than 100 meters below the surface. There is an estimated 10 to 50 cubic meters of water, per section, being pumped from this aquifer daily for a variety of uses including household and agricultural use.

According to the Hydrogeology of Edmonton Area (Northeast Segment), groundwater flows northwest towards the North Saskatchewan River with probable estimated yields of 0.4 - 2 litres per second throughout LEA.

A search of Alberta Environment and Parks' Authorization Viewer on March 21, 2018 found two Traditional Agricultural Registrations under the *Water Act* for the purposes of raising animals and applying pesticides to crops. Table 6 shows the total of all registrations is 2,763 cubic meters of water annually, a copy of each registration is available in Appendix A.

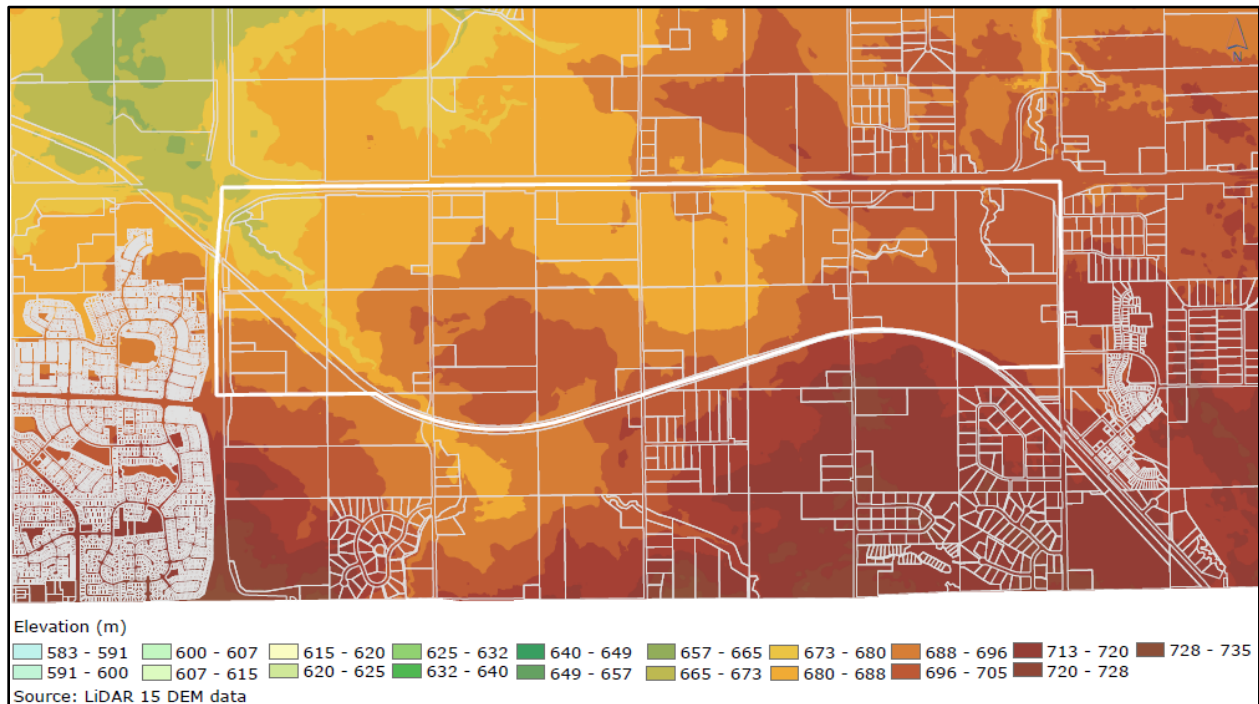
Table 6: Water Licences

Land Location	Water Source	Amount of Water (m3/year)	Priority No.
NW 9-53-22 W4	Unnamed Aquifer – Unclassified	2490	1940-01-01-013
NE 9-53-22 W4	Unnamed Aquifer – Unclassified	273	1995-07-15-011
Total Amount of Water (m3/year)		2763	

2.2.5 Slope/Topography

The topography in LEA is described as hummocky and undulating with both low and high relief landforms of varying elevations found throughout. Elevations range from approximately 669 m near Oldman Creek in the northwest to 704 m in the east portion of the Development Expansion Area near Pointe-Aux-Pins Creek. The area surrounding Point-Aux-Pins Creek shows significantly less variation in elevation and is approximately 700 m which is consistent throughout the eastern portion of the Development Expansion Area. The landscape generally slopes west northwest as illustrated in Figure 7.

Figure 7: Topography



2.3 Agricultural Inventory

2.3.1 Existing Agricultural Production

The majority of agricultural land in LEA is dedicated to cropping but there is also a significant amount of land used for pasture. In addition to crop and pasture land, there are nine homesteads, one cattle operation and three horse operations.

Figure 8: Existing Agricultural Production



Interviews with farmers over the summer of 2016, indicated that they had historically rotated cereal-canola on a two year rotation but due to the changing climate and an increase in returns, a higher percentage of farmers are planting pulses and have begun a cereal-pulse-canola three year rotation. Average yields from 2016 are presented in the table below.

Table 7: Average Yield

Crop Type	Average Yield For 2016 (Bushels/Acre)
Wheat (Hard Red)	75
Barley	115
Field Peas	55
Faba Beans	62.5
Canola	56.5
Soybeans	40

Source: Agricultural Services, Strathcona County.

2.3.2 Non-Agricultural Land Use

Non-agricultural land use within LEA is limited but some potential conflicts that could affect farming operation do exist. Potential conflicts include some local industrial operations, commercial business, and Strathcona County's snow melt facility.

Local industrial and commercial businesses may cause increased traffic which has the potential to affect farmers moving equipment or farm animals from time to time or seasonally. Strathcona County's snowmelt facility may cause increased traffic during the winter months.

2.3.3 Parcel Size, Configuration, and Agricultural Accessibility

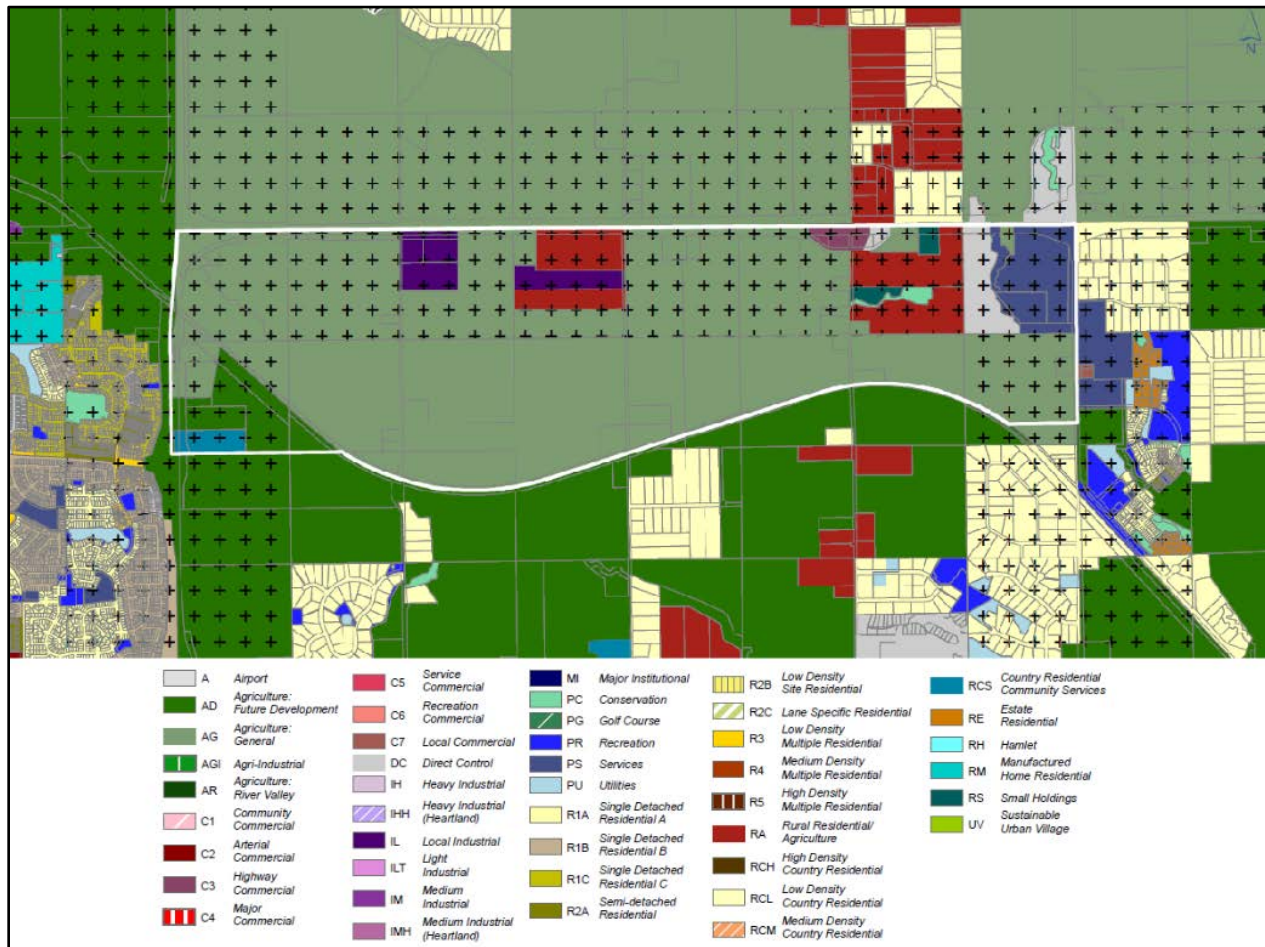
Currently there are few limitations to agricultural accessibility in LEA and it can be accessed from the north, east, south and west from major highways, service roads and a series of Strathcona County owned range roads. A review of recent air photos (2017) showed that most parcels had one access however five parcels had no apparent access and two of those five parcels where land locked with no roads adjacent to them.

Parcels with drainage corridors that split the parcel often had visible culvert style crossings installed to allow for year round access.

Access for agricultural operations will need to be maintained during the development of LEA with special consideration given to existing parcels that do not have any direct access to range roads or service roads.

A table of parcel size and zoning of each LEA parcel are provided in Appendix B. Figure 9 shows the current zoning districts for LEA and the surrounding areas.

Figure 9: Zoning Districts



2.3.4 Agricultural Economic Impact

The agricultural economic impact assessment prepared by Serecon Inc. found an annual impact between \$4,820,022 and \$10,861,158 to the provincial GDP. Serecon Inc. recommends using the higher estimated loss prediction of \$10,861,158 as it is a better representation of the economic impacts on the province as a whole.

Serecon's analysis of the economic impacts of developing LEA is provided under a separate cover in Appendix C.

2.4 Surrounding Lands

2.4.1 Surrounding Land Use Types

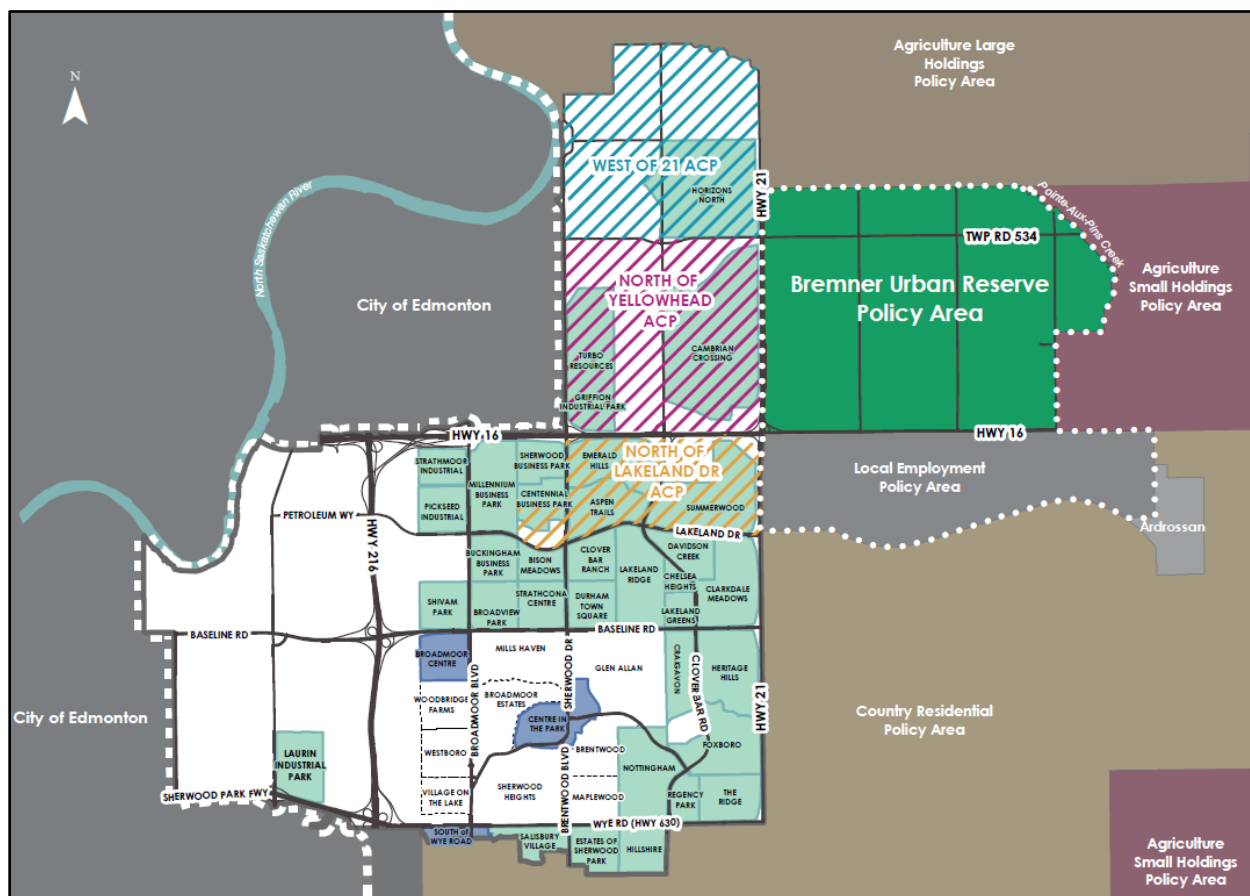
Immediately west of LEA is the Urban Services Area of Sherwood Park which is primarily residential and commercial development.

The majority of land to the north is under the Bremner Urban Reserve Policy Area with the rest of LEA's northern boundary abutting the Agricultural Small Holdings Policy Area which is intended to remain agricultural under the current MDP.

A small portion of the lands east of LEA and all of the land directly south are part the Country Residential Policy Area which accommodates existing agricultural operations, single family residential as well as some home based businesses.

The remainder of LEA's east boundary is shared with the Hamlet of Ardrossan.

Figure 10: Surrounding Land Use Zones



Source: Strathcona County, Planning and Development Services.

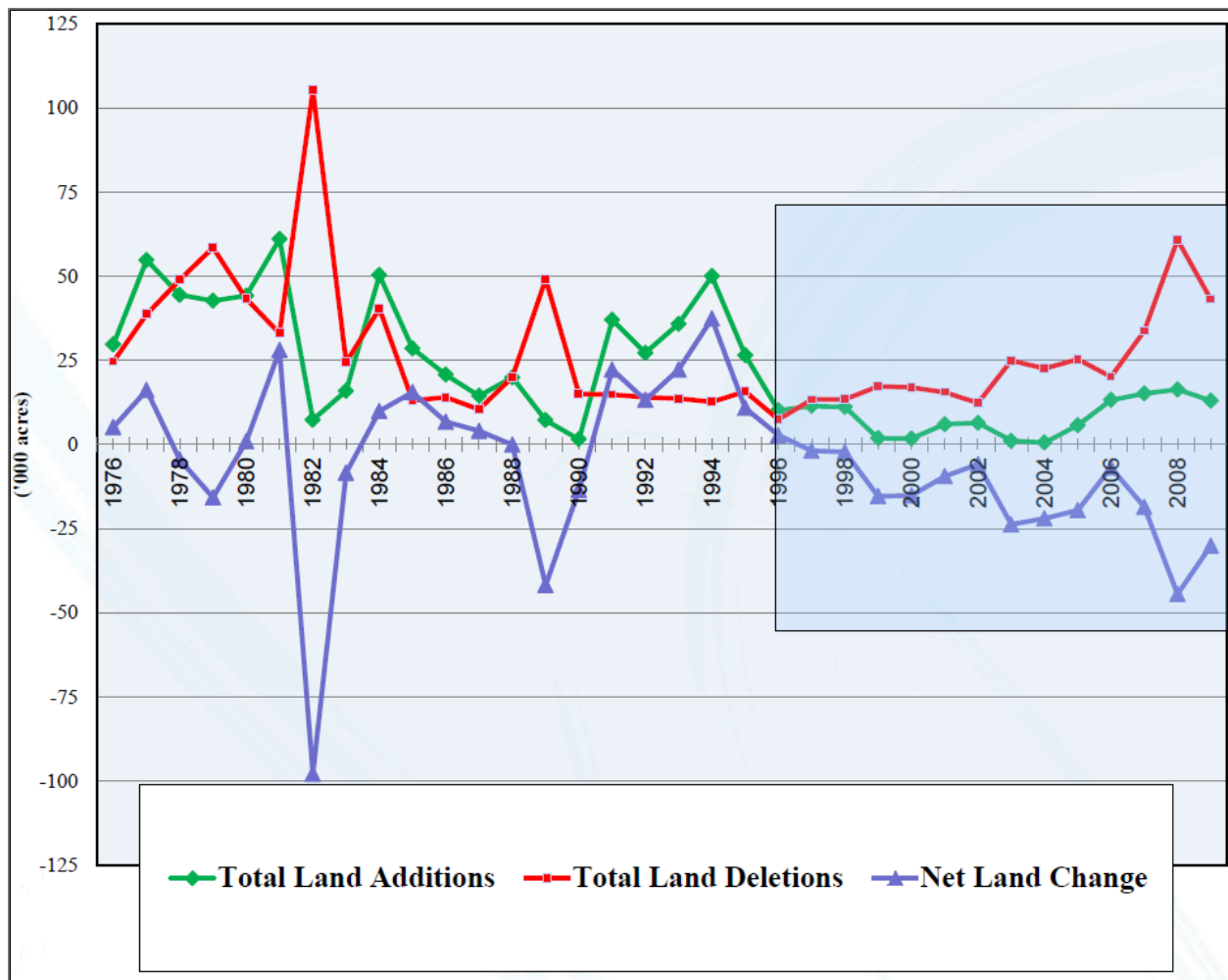
2.4.2 Regional Land Use, Lot and Tenure Patterns

According to Alberta Agriculture, Food and Rural Development's 2002 report "Loss and Fragmentation of Farmland" urban sprawl from population growth is a key contributing factor to the loss and fragmentation of farmland. Over 86% of the farmland lost in Alberta is due to oil and gas activities and subdivision development. Over half of the land lost is considered higher quality agriculture land and is Class 1, 2 or 3.

From 1976 to 1996 the province regularly monitored and reported changes to agricultural land within Alberta. During that period, there was a net loss of less than 0.5 % of Alberta's agricultural land. However, monitoring did not include losses due to fragmentation.

Staff from Alberta Agriculture and Rural Development indicated that from 1996 to 2009 an additional 400,000 acres of farmland was temporarily and permanently converted or fragmented. Of those 400,000 acres, approximately 183,000 acres of agricultural land was permanently lost in the Calgary-Edmonton corridor. The province is currently working to update the information to reflect agricultural land loss to date and it is expected that rate of agricultural land loss will be higher than it was prior to 1996 due to the economic expansion experienced by Alberta between 1996 and 2014. Figure 11 illustrates predicted losses between 1996 and 2009.

Figure 11: Agricultural Land Base Changes in Alberta from 1976 to 2009



Source: Jason Cathcart, Manager of Land-use Policy, Alberta Agriculture and Rural Development.

The “Economic Evaluation of Farmland Conversion and Fragmentation in Alberta, Summary of Findings” produced by the Alberta Land Institute in 2017 identified that farmland and natural areas in the Edmonton Calgary Corridor became more fragmented between 1984 and 2013 and that most of the land converted to developed uses between 2000 and 2012 was of high suitability for agricultural uses.

For the report, a survey urban and rural residents was conducted in the Alberta Capital Region that found that both were concerned about urban expansion and the loss of natural and agricultural land. The residents surveyed indicated that conserving farmland was most important to produce *food for the local market, followed by air quality, water purification, scenic beauty, and production of food for the global market*. Respondents also indicated that they were more interested in the scenic value of farmland as viewed from highways than conserving the highest value farmland.

2.4.3 Availability of Agricultural Services

Agriculture support services are spread throughout the Edmonton Metropolitan Region and likely serve not just the region but also farming operations in northern and central Alberta. The closest grain elevator is about 36 kilometres northwest and the nearest canola crusher is about 23 kilometres north of LEA. Other services within a 12 kilometre radius include a seed supplier, fertilizer distributor, fuel delivery service, veterinary services and farm

equipment sales and repair. LEA is well serviced with most farming necessities located less than an hour away by vehicle.

3.0 Agricultural Viability

Very little data exists on the minimum size of farm needed to be viable in Alberta and sustainable in the long term. According to the most recent Alberta Agriculture Statistics Yearbook (2015), the average farm size in Alberta is 740 hectares (1829 acres) however; there is no information available about farm configurations and whether the average farm consists of parcels that are adjacent, spread apart in fragmented parcels. The current area being farmed in LEA is approximately 2,000 hectares and there are over 70 landowners.

Due to its close proximity to the Edmonton Metropolitan Region, LEA could also potentially support other types of farms such as market gardens, u-picks, tree nurseries, cannabis production facilities, greenhouses and floriculture operations which tend to be smaller in size.

4.0 Potential Impacts on Agriculture

Current land use conflicts include slow moving farm traffic, noise, dust and drainage issues.

The most significant expected impacts to neighbouring farming operations are transportation issues, especially during planting, spraying and harvesting. Traffic volumes will increase as LEA developments.

It is currently unknown if there will be significant impacts to agri-business such as seed and equipment suppliers.

The Local Employment Area is expected to start development approximately 9 year after Bremner begins.

5.0 Mitigation Measures

Table 8: Mitigation Measures

Agri-tourism and Agri-business	Continue to provide opportunities for small scale agri-tourism and agri-businesses such as agricultural product processing, agricultural support services, agriculturally related home based businesses and associated sales within LEA.
	Ensure that rural roads and accesses within LEA continue to accommodate farm machinery (large, wide, slow-moving) and provide access to farmland.
	Consider the effects on current and future agriculture within LEA when establishing development phasing. Phasing should attempt to allow agricultural operations to continue as long as possible prior to development.
Other	Encourage visual features in LEA's Design and Construction Standards, like tree plantings that act can as a buffer between LEA and adjacent agricultural areas, particularly areas south of LEA.
	Ensure LEA's Design and Construction Standards require that plant species are not invasive.
	Where introduced plant species (from landscaping) are prone to disease or pests, ensure that appropriate measures are taken through County Design and Construction Standards and programming and operations to prevent disease spread into agricultural lands.
	Ensure LEA design and construction standards requires the reuse of topsoil within LEA and create a topsoil management plan (Proposed Topsoil Conservation and Management Plan available in Appendix D) to support the design and construction standards.
	Ensure that developers are aware of clubroot management requirements to ensure that clubroot is not spread to other agricultural areas.

6.0 Discussion

While there are methods available to measure the economic loss of converting agricultural land to developed uses, there is currently no way for a single municipality to economically form a complete measure of the potential effects of land conversion on issues such as local and global food security, loss of ecosystem services provided by agricultural lands or social and cultural consequences of losing agricultural lands.

A broader regional discussion may be needed to address the long term costs of lost ecosystem services provided by agricultural land such as flood and drought mitigation, water and air quality regulation, wildlife habitat services and pollination. In cases where agricultural lands are converted due to low servicing costs for urban development, a cost analysis that looks at ecosystem services losses may change the overall cost of development in the long term. What seems like a smart economic decision might not be.

Ideally, the Edmonton Metropolitan Region Growth Plan would identify natural and agricultural lands for conservation, taking all factors into consideration so that firm direction on where growth should or should not occur, based on long term environmental, economic and social sustainability is provided. Further work should also be completed to determine the critical mass of agricultural land needed to sustain the agricultural industry in the region.

7.0 Limitations and Qualifications

In conducting this assessment and rendering our recommendations, Strathcona County gives the benefit of its best judgment based on its experience and in accordance with generally accepted professional standards for this type of assessment. This report was submitted with the best available information to date and on the information provided. The recommendations made within this report are a professional opinion, no other warranty, expressed or implied is made. This report has been prepared for the exclusive use of Strathcona County for the purposes of assessing the agricultural impacts of the proposed development of LEA. Any use which any third party makes of this report, or any reliance on or decisions to be made on it, are the responsibility of such third parties. Strathcona County accepts no responsibility for damages, if any, suffered by any other third party as a result of decisions made or actions based on this report.

8.0 References

Strathcona County (2017). Strathcona County Municipal Development Plan Bylaw 20-2017: Forwarding Our Future Together.

Strathcona County (2018), 2013-2030 Strategic Plan: Becoming Canada's Most Livable Community.

Alberta Environment and Parks (February 23 and 27, 2017). Traditional Agriculture Registration Viewer. Retrieved from <https://avw.alberta.ca/TraditionalAgricultureRegistrations.aspx>

Kathol, C.P. and McPherson, R.A. 1975. Urban Geology of Edmonton, Bulletin 32.

Bayrock, L.A. and Hughes, G.M. 1962. Surficial Geology of the Edmonton District, Alberta. Research Council of Alberta.

Stein, R. 1976. Hydrogeology of the Edmonton Area, (northeast segment), Earth Sciences Report 76-1, Alberta Research Council.

Policy Secretariat, 2002. Loss and Fragmentation of Farmland, Resource Planning Group, Alberta Agriculture, Food and Rural Development.

Alberta Soil Information Centre. 2001. AGRASID 3.0: Agricultural Region of Alberta Soil Inventory Database. Edited by J.A. Brierley, T.C. Martin, and D.J. Spiess.

Government of Alberta. 2008. Land Use Framework. Available Online: https://www.landuse.alberta.ca/Documents/LUF_Land-use_Framework_Report-2008-12.pdf.

Rashford, B.S., C.T. Bastian, & J.G. Cole. 2011. Agricultural Land-Use Change in Prairie Canada: Implications for Wetland and Waterfowl Habitat Conservation. Canadian Journal of Agricultural Economics.

Qiu, F, L. Laliberte, B. Swallow, and S. Jeffrey. 2015. Impacts of fragmentation and neighbor influence on farmland conversion: A case study of the Edmonton-Calgary Corridor, Canada.

Hydrogeological Consultants Ltd. Agriculture and Agri-Food Canada. Prairie Farm Rehabilitation Administration. Strathcona County, Part of the North Saskatchewan River Basin Regional Groundwater Assessment, Parts of Tp 050 to 057, R 20 to 24, W4M.

Toma & Bouma Management Consultants. Stantec. 2015. Strathcona County | Agriculture Master Plan: A Time to Choose.

Strathcona County. 2015. Land Use Bylaw 6-2015.

Appendix A Water Act Registrations



Registration for Traditional Agriculture User Under The *Water Act*

Land Location: NW 09-053-22-W4

File No.: 00173650

Registration No.: 00173650-00-00

Water Source	Amount Of Water (m ³ /year)	Priority No
Unnamed Aquifer - Unclassified	2490	1940-01-01-013

The information on this printout is derived from the Alberta Environment and Parks official database.

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**Registration for Traditional Agriculture User
Under The *Water Act***

Land Location: NE 09-053-22-W4

File No.: F00168633

Registration No.: 00168633-00-00

Water Source	Amount Of Water (m ³ /year)	Priority No
Unnamed Aquifer - Unclassified	273	1995-07-15-011

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Appendix B Parcel Size and Zoning

ATS	LUB DESCRIPTION	LOT SIZE (sq m)	LOT SIZE (ha)
SW7-53-22	AG - Agriculture: General	25515.52	2.55
NE7-53-22	AG - Agriculture: General	574253.61	57.43
SE8-53-22	AG - Agriculture: General	707288.73	70.73
NW7-53-22	AG - Agriculture: General	287852.92	28.79
NE8-53-22	IL - Local Industrial	114594.42	11.46
NE8-53-22	RA - Rural Residential/Agriculture	114594.42	11.46
NE7-53-22	AG - Agriculture: General	8093.07	0.81
NE9-53-22	C3 - Highway Commercial	13880.29	1.39
NE9-53-22	C3 - Highway Commercial	5442.10	0.54
NE6-53-22	AG - Agriculture: General	33404.69	3.34
NE8-53-22	RA - Rural Residential/Agriculture	160622.93	16.06
NE8-53-22	AG - Agriculture: General	37057.06	3.71
NW10-53-22	RA - Rural Residential/Agriculture	221125.57	22.11
SE7-53-22	AG - Agriculture: General	550562.43	55.06
SW7-53-22	AG - Agriculture: General	112592.22	11.26
SE10-53-22	AG - Agriculture: General	519013.28	51.90
SE9-53-22	AG - Agriculture: General	12376.57	1.24
NE8-53-22	AG - Agriculture: General	161855.73	16.19
NW7-53-22	AG - Agriculture: General	2284.77	0.23
SW9-53-22	AG - Agriculture: General	10523.88	1.05
NW7-53-22	AG - Agriculture: General	489.83	0.05
NW7-53-22	AG - Agriculture: General	100836.18	10.08
SW7-53-22	AG - Agriculture: General	58778.43	5.88
SE9-53-22	AG - Agriculture: General	96933.27	9.69
NW10-53-22	AG - Agriculture: General	31481.52	3.15
NE8-53-22	AG - Agriculture: General	5374.11	0.54
SW7-53-22	AD - Agriculture: Future Development	72045.74	7.20
NW10-53-22	RA - Rural Residential/Agriculture	197463.38	19.75
SW9-53-22	AG - Agriculture: General	40461.66	4.05
NE9-53-22	AG - Agriculture: General	26236.94	2.62
NW7-53-22	AG - Agriculture: General	10394.51	1.04
NW7-53-22	AG - Agriculture: General	1044.84	0.10
SE7-53-22	AG - Agriculture: General	10266.59	1.03
NW7-53-22	AG - Agriculture: General	181133.52	18.11
SW10-53-22	AG - Agriculture: General	286019.34	28.60
NW5-53-22	AG - Agriculture: General	193913.64	19.39
NE10-53-22	AG - Agriculture: General	12287.53	1.23
NE9-53-22	AG - Agriculture: General	13230.42	1.32

NE9-53-22	AG - Agriculture: General	11624.96	1.16
NE9-53-22	AG - Agriculture: General	170009.25	17.00
NW9-53-22	AG - Agriculture: General	16180.37	1.62
NW10-53-22	DC - Direct Control	5093.60	0.51
NW10-53-22	C3 - Highway Commercial	13874.45	1.39
SE8-53-22	AG - Agriculture: General	38874.77	3.89
NW8-53-22	IL - Local Industrial	80885.35	8.09
NW8-53-22	IL - Local Industrial	42962.24	4.30
SW10-53-22	AG - Agriculture: General	19803.76	1.98
NW8-53-22	AG - Agriculture: General	442850.35	44.29
NW10-53-22	RS - Small Holdings	21706.24	2.17
NW9-53-22	AG - Agriculture: General	274803.14	27.48
NE9-53-22	AG - Agriculture: General	316577.23	31.66
SE9-53-22	AG - Agriculture: General	345733.27	34.57
SW9-53-22	AG - Agriculture: General	251489.29	25.15
NW10-53-22	RS - Small Holdings	32617.73	3.26
SW8-53-22	AG - Agriculture: General	29447.73	2.94
SE7-53-22	AG - Agriculture: General	10232.34	1.02
NW9-53-22	AG - Agriculture: General	272691.93	27.27
SW9-53-22	AG - Agriculture: General	220213.46	22.02
SW9-53-22	AG - Agriculture: General	40456.74	4.05
NW10-53-22	AG - Agriculture: General	12139.08	1.21
NW9-53-22	AG - Agriculture: General	29950.41	3.00
SW8-53-22	AG - Agriculture: General	454527.57	45.45
SW8-53-22	AG - Agriculture: General	160999.95	16.10
NW8-53-22	IL - Local Industrial	25744.67	2.57
SW7-53-22	AD - Agriculture: Future Development	12644.76	1.26
NE10-53-22	PS - Public Services	63449.11	6.34
NE10-53-22	PS - Public Services	26686.55	2.67
NE10-53-22	DC - Direct Control	181998.16	18.20
NE10-53-22	PS - Public Services	7037.08	0.70
NW10-53-22	PC - Conservation	33167.12	3.32
NE10-53-22	PS - Public Services	27585.06	2.76
SE10-53-22	AG - Agriculture: General	15311.15	1.53
NW7-53-22	AG - Agriculture: General	15922.39	1.59
NW7-53-22	AG - Agriculture: General	7617.66	0.76
SE7-53-22	AD - Agriculture: Future Development	41950.47	4.20
SW7-53-22	AD - Agriculture: Future Development	215009.55	21.50
SW7-53-22	RCS - Country Residential Community Services	70955.99	7.10
NE10-53-22	PS - Public Services	220908.18	22.09

Local Employment Area Agricultural Economic Impact Assessment

Prepared For

STANTEC

Prepared By

Serecon Inc.

Edmonton, Alberta

March 28, 2019



March 27 2019

Stantec
10160 112 Street
Edmonton AB T5K 2L6

RE: Local Employment Area Agricultural Economic Impact Assessment

We are pleased to provide the following report outlining our assessment of the economic impacts associated with the development on Agricultural lands in the Local Employment Area. This assessment has been conducted using the most relevant data available for the area and multipliers provided by Alberta Treasury.

We have also looked at a secondary approach to the question using the contribution margin generated by a typical farm in the specific region. Results from these two approaches vary significantly but do provide the upper and lower boundaries of impacts.

We trust that this information will be of use to you and your client, Strathcona County. Please do not hesitate to contact me directly with any questions that you might have.

Yours truly,
Serecon Inc.



Markus Weber
B.Sc.Ag, MBA, LL.B., P.Ag.

Enclosure

Executive Summary

Agricultural Economic Impact

Our analysis suggests that the total Agricultural Economic Impact for the Local Employment Area (LEA) falls within the **range of \$4,820,022 to \$10,861,158**. The low end of this range is based on the approximate net cash proceeds farmers earn following the Contribution Margin approach while the high end is based on using Gross Domestic Product (GDP) estimation with an Input/Output (I/O) model using provincial-level multipliers.

It is important to note that the Contribution Margin approach accounts only for the part of upstream and supporting industry effects of agricultural operations in the Bremner area. Given that there are obvious additional economic impacts, **we recommend using the \$10,861,158 estimate** we obtained from the I/O model as an assessment of the overall agricultural impact that removing agriculture from the LEA would have on Alberta's economy.

The recommended estimate may be felt to be somewhat overstated when compared with the net cash proceeds farmers earn. However, it gives a better idea of the total GDP these proceeds generate when farmers spend this money in the local economy.

Limitations of Scope and Information that affect the Recommended Estimate

The Alberta Treasury and Finance calculates multipliers for the whole province and some upstream businesses located elsewhere in Alberta are not present in Strathcona County. Thus, farmers do not spend all the money earned in Strathcona County and therefore the \$10,861,158 GDP estimate is their impact on the province as a whole, not just the County. Nevertheless, most of their spending does occur within municipal borders. Two more factors suggest that the GDP generation is even higher:

1. The I/O model does not account for the induced impact of business profits that farmers may re-invest into farming operations or other business expansions in the county over time. The GDP multipliers account for their regular business and household expenditures but omit savings, which they may direct in expanding their business. Our profitability analysis indicates that the farmers would have this opportunity. Although there is not enough information to quantify such effect, there is little doubt that it exists and is likely material.
2. It is our opinion that the exact scope of the equine and beef sector impacts would not have material impact on our assessment. The beef cattle sub-sector accounts for less than 4.5% of the overall primary agricultural GDP in the County. Based on aerial imagery, it does not appear that there are any substantial beef operations in the LEA, but pastures would be expected to be contributing to the feeding of cattle located outside the area. In addition, the Local Employment Area does appear to have at least one significant equine operation and while the impact of that is certainly non-zero, it would increase the total GDP only marginally above our estimates.



Key Considerations

We have considered all economic factors and contributions of crop and beef cattle operations located in the Bremner area. In the case of crop production, we have used typical rotations and land use allocations derived from 2014-2016 remote sensing data. This data is the most recent and consistent dataset available. In calculating the financial flows and risk factors (the discount rate) we tried to maintain consistency and use the information from the same or similar period. For revenues and costs, we used the years 2012-2016 and we calculated the discount rate based on 2009-2016 data.



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Introduction

This report provides an objective assessment of the economic impact that farming operations in the Local Employment Area generate – and more precisely the impact that removal of those operations will have given a permanent change in land use from agriculture to the planned urban development. These impacts need to be assessed under perpetual change conditions since the allocation of land for development usually means a rapid change, which is long-term enough to be considered indefinite for the economic analysis. Our understanding is that this assessment may be included as one of the inputs into Strathcona County's overall Agricultural Impact Assessment from the development of the area.

We begin by setting a broader context and analyzing agricultural activity at the county level. We then narrow the focus and present the information that is available and calculated specifically for the Local Employment Area (LEA).

Our analysis involves two approaches:

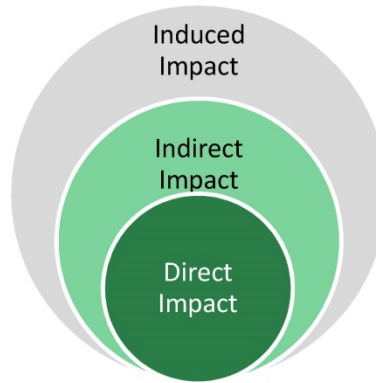
- **I/O Model:** The first approach utilizes an economic impact calculator and quantifies the financial value the agriculture industry contributes to the local, regional and provincial GDP. It includes consideration for direct spending from the employers in the area, as well as those whose employment income originates from the industry. This is calculated using an Input/Output (I/O) model approach. The I/O model was designed to measure such impacts for "shock" type changes when the use of economic resources changes once for indefinite or very long period and as such fits this purpose well.
- **Contribution Margin Model:** A second approach involves calculating a contribution margin for the agricultural producer to reflect the amount of income available for re-investment. This information is used to help validate the amounts directly available to Strathcona County since the I/O model is only applicable in full at the provincial level. On the other hand, this approach does not consider multiplier effects.

As a result, the ultimate economic impact of primary Agriculture on Strathcona County will be somewhere between these two figures, and likely closer to the I/O result. We have provided both to provide a more robust assessment.

Economic Multipliers

Economic multipliers are used to measure the economic activity that is generated when purchases and investments are made by a business or a sector, including the resulting spin-off activities. The multipliers are used to estimate the total impact on economic activity rather than just the first-order impact. These models are designed to be used for estimates that a change in economic activity will have on the overall economy. In this case, the change in use from agriculture to other urban uses will result in less farm revenue, but also in farm-related expenditures. The goal of the economic impact estimates is to model this overall impact, which includes three types of impact as outlined in Figure 1 below.

Figure 1: Types of Economic Impact



- **Direct Impacts**
the effects occurring to spending of the sector where the change in economic activity takes place (e.g. the removal of agriculture results in less spending on farm-related business inputs)
- **Indirect Impacts**
the effects occurring to the backward-linked industries that supply the sector experiencing a change in economic activity (e.g. feed mills or crop input suppliers receive less business and in turn decrease their purchases)
- **Induced Impacts**
the effect that a change in income of employees will have on their personal expenditures on goods and services (e.g. both the employees of farms and their upstream suppliers will have less income to spend)

Our analysis accounts for and models the direct, indirect and induced impacts on the Alberta economy of removing agricultural production from the Local Employment Area.

Purpose and Function

The economic impact is a measure of value that activity creates for society. It is used to assess alternatives for resource allocation, such as land. We have used a specifically designed I/O model and respective multipliers for this purpose. These multipliers have been updated and released by Alberta Treasury Board and Finance in 2017 for the base year 2013.

The economic impact types outlined above would specifically include the following potential outcome areas in the specific case of LEA agriculture:

- **Direct consequences of the change** – the effects of changes to spending activities that would occur. These are most likely directly related to changes in the purchases of inputs like farm supplies (seed, fertilizer, fuel), veterinary services, equipment, other;
- **Indirect impacts** – the effects occurring in the backward-linked industries that currently supply the primary agriculture sector in the LEA. These include the multiplier effects of the loss of direct expenditures as well as employment and other economic activities that are indirectly tied to agricultural production. We also consider the impacts on adjacent lands and how this might

affect decisions made on the investment in agriculture. An example of indirect expenses would include employment in the farm supply chain: fertilizer and seed distribution, agronomy services as well as employment in the industries including gas stations and office supply stores.

- **Induced impacts** – typically associated with the income earned by employees from the ag and upstream sectors who spend it on goods and services in the area that would no longer be available. This type of impact concerns businesses directly serving the general community regardless of the industry sector. The examples may include grocery and corner stores, entertainment industry, education and other. These businesses generate the revenue from spending that employees in primary agriculture and farm input supply industries earn.

The total of these elements represents the full economic impact of the changes that are likely to occur because of the forecast urban development. For every dollar of initial expenditures by agricultural producers, total spending throughout the local economy would have historically increased by a more substantial amount^a. As the land use changes over time, these farming expenditures would be lost and diverted.

The report considers area land uses, livestock operation profiles, soil capability ratings, productivity information, and crop rotations.

Information Sources

A variety of sources were used in researching the subject property and surrounding areas. Data used included remote sensing data, land use documents, various area maps, and agricultural statistics from the following sources:

- Agriculture and Agri-Food Canada
- Strathcona County
- Canada Land Inventory (Soil Capability for Agriculture)
- Statistics Canada (Census of Agriculture)
- Alberta Agriculture and Forestry
- Alberta Treasury Board and Finance

Agriculture in Strathcona County

2016 Statistics

An overview of agriculture at the County level determines the context for this engagement. A complete summary of this analysis includes statistical information on the agricultural industry, as well as technical aspects of agricultural suitability and soil capability within the County

Strathcona County had 164,078 acres in annual crop production according to the 2016 Census of Agriculture. There is significant diversity in output due to its geographic positioning, and proximity to a large metropolitan area.

The following table contains the data reported in Strathcona County from Statistics Canada^b.

a - While we used a different set of multipliers based on the basic agricultural commodity prices it approximately corresponds to 2.124 in a farmer's expenditure to illustrate this explanation. That is, for each dollar a farmer spends in producing agricultural commodity, the total economy increases for additional \$1.124 and thus creates accumulated effect of \$2.124 on GDP

b - Statistics Canada. *Table 004-0203 – Census of Agriculture, land use, every 5 years*, CANSIM (database). (accessed: 12.19.17)

Table 1: Agricultural Land Use in Strathcona County

Land use	Unit of measure	2011	2016	Change
Land in crops (excluding Christmas tree area) ^c	Number of farms reporting	478	407	-15%
	Acres	150,138	164,078	9%
Summerfallow land ^b	Number of farms reporting	37	35	-5%
	Acres	2,958	1,217	-59%
Tame or seeded pasture	Number of farms reporting	226	175	-23%
	Acres	19,555	18,418	-6%
Natural land for pasture	Number of farms reporting	344	301	-13%
	Acres	33,002	24,816	-25%
Woodlands and wetlands	Number of farms reporting	273	234	-14%
	Acres	x ^d	11,022	n/a
Christmas trees, woodlands, wetlands	Number of farms reporting	274	235	-14%
	Acres	8,439	11,036	31%
All other land ^b	Number of farms reporting	494	387	-22%
	Acres	6,092	4,910	-19%
Total Area of Farms (Acres)		220,184	224,475	2%
Total Number of Farms		658	579	-12%
Average Farm Size (Acres)		335	388	16%

The data indicates that approximately 56% of Strathcona County's land base was being used as crop or pasture land in 2016.

While remaining an important economic contributor, agriculture in the County is characterized as having several interesting and important trends. These include:

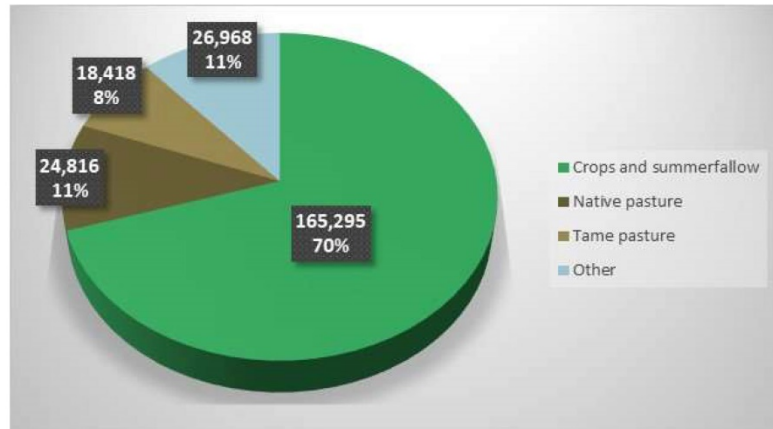
- A trend to fewer farms within the county;
- A reduction in native and tame pastureland;
- An increase in the average farm size between 2011 and 2016; and
- An increase in total cultivated acres^e.

^c – In 2011, in Alberta, Saskatchewan, and Manitoba, land that was reported as "too wet to seed" has been classified as "other land" instead of cropland or summerfallow.

^d – Suppressed to meet the confidentiality requirements of the Statistics Act

^e It is important to note that this may well be a result of the way Census reporting works where acres are linked to the postal code of the owner and not necessarily where the acres are.

Figure 2: Farming in Strathcona County as per 2016 Agricultural Census



As of 2016, the Census of Agriculture reported 579 farms in Strathcona County. While the crop farms occupied most of the land, they represented less than a half of all farms, with only 118 operations declaring specialization in traditional annual crops production. In comparison, 119 operations specialized in forage production for the livestock sector and 281 operations claimed specialization in the livestock industry itself. The actual distribution is presented in Table 2.

Table 2: Farm Specialization in Strathcona County

Farming Activity by Farm Specialization	Farms	%
Crop (wheat, canola, other grain)	118	20.38%
Forage and other	119	31.09%
Livestock	281	48.53%
Total	579	100%

Table 3: Livestock-Related Farm Specialization in Strathcona County

Livestock-related Farming Activity	Farms	%
Beef cattle ranching and farming, including feedlots	115	40.9%
Horse and other equine production	107	38.1%
Other livestock farming	59	21.0%
Total	281	100%

The cow herd in Strathcona County comprised up to 5,916 head, with horses accounting for 2,139 animals in 2016. The rest of the livestock operations represented less than 25% of the total sector based on the reported farm specialization.

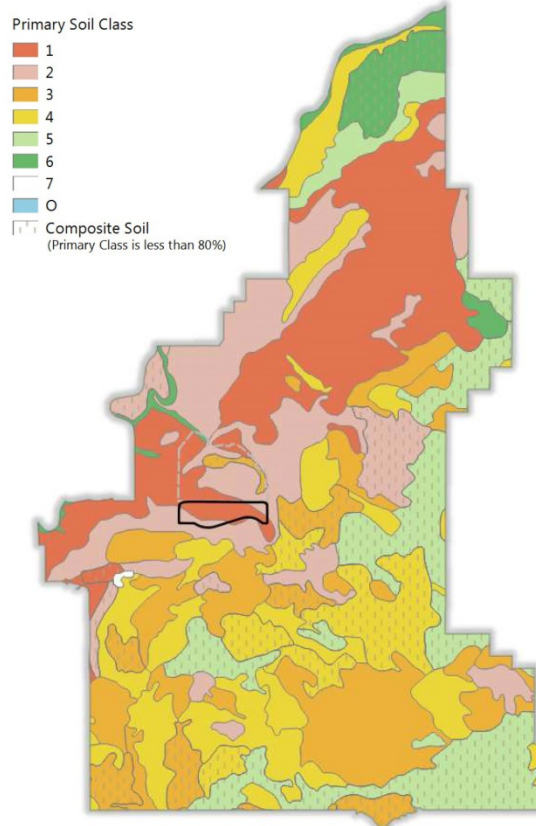
Table 4: Main Livestock Herds in Strathcona County

Animal Profile	Head
Total cows	5,916
Horses and ponies	2,139
Total	8,055

Canada Land Inventory

The Canada Land Inventory Soil Capability for Agriculture (CLI) ratings provide an indication of soil productivity capacity concerning agriculture. These ratings are analyzed at the County level below, with the subject area outlined in black.

Figure 3: Strathcona County CLI Map



The LEA is in the area characterized with more productive agriculture lands that run Southwest to Northeast of the county.

The following table summarizes Strathcona County's land base by primary soil class, with Class 1 being the most productive and Class 7 being least productive regarding land use and productivity for agricultural production.

Table 5: Soil Classes in Strathcona County

Primary CLI Soil Class Component	Area in Strathcona County (acres)	Percent of Total County Land Base
1	57,454	19.7%
2	51,570	17.6%
3	60,572	20.7%
4	64,479	22.1%
5	46,705	16.0%
6	11,259	3.8%
7	234	0.1%
Total	292,271	100%

The majority of the Local Employment Area's soils fall into Class 1 and 2 and this is further outlined in Table 6 below.

Subject Area

The area is in Strathcona County: South of the Trans Canada Highway 16 (Yellowhead Highway), between Range Road 222 (secondary Highway 824) and Range Road 230 (Highway 21), north of the CN rail line and including the entirety of 7-53-22-W4. The area includes portions of 19 quarter sections. Aerial imagery of the Local Employment Area is provided in Figure 4 below.

Figure 4: Aerial Map



The Local Employment Area has approximately 2,400 acres of land, which can be accurately distributed among usage patterns based on remote sensing technology. This land base equates to 0.8% of the area in the County. Cropland within the subject comprises 0.6% of farmland within the county.

Soil classes in the subject area include Class 1, and Class 2T.

We present subject soil classes as a percentage of the total in the County. These percentages are based on primary soil class of the LEA as a percentage of the soil in the County of the same primary class whose secondary soil class is equal to the subject.

Table 6: Soil Classes in Local Employment Area

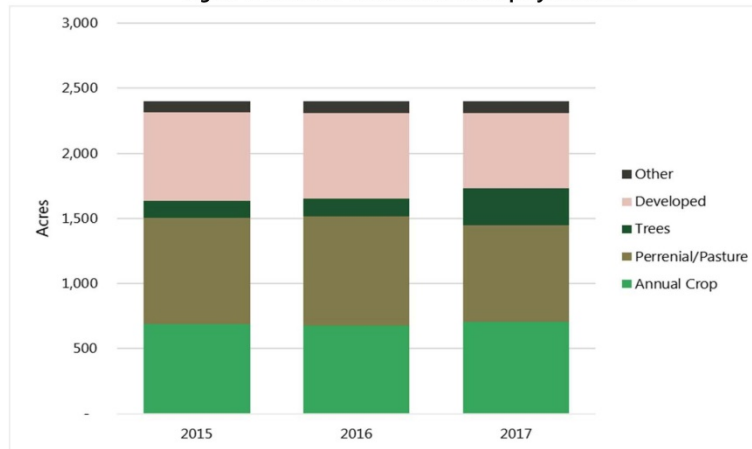
Primary Soil Class	Acres in LEA	Acres in LEA, %	LEA Acres as % of County
1	1,680	70.0%	2.8%
2	720	30.0%	1.8%
Total	2,395	100.0%	0.8%

The data indicates that the Local Employment Area contains a higher proportion of quality agricultural soils in Class 1 and 2 than the County as a whole. In other words, the subject soil is more agriculturally productive than land commonly found in Strathcona County.

Land Use

As of 2016, existing land use in the LEA is primarily agricultural (70%) with country residential making up most of the remaining land.

The following chart shows the land use trend within the subject area, with some increase to developed acres already.

Figure 5: Land Use Trends in Local Employment Area

Table 7: Land Use in Local Employment Area

Year	Annual Crop		Perennial Crop, Pastures, and Grassland		Tree Cover		Developed Land		Other		Total
	Acres	% chg.	Acres	% chg.	Acres	% chg.	Acres	% chg.	Acres	% chg.	
2015	691.0	-11%	815.7	9%	126.1	-41%	681.0	25%	86.2	-25%	2,400
2016	679.3	-2%	838.0	3%	133.1	6%	661.6	-3%	88.0	2.1%	2,400
2017	706.4	4%	743.0	-11%	286.4	115%	575.2	-13%	89.0	1.1%	2,400

Remote Sensing

The following maps show the LEA land use data in the years between 2015 and 2017. The legend displayed applies to all the charts within the series. Some growth in the pink (Urban/Developed) areas is visible between Figure 5 and Figure 7. This may be due in changes in the methodology used for creation of this dataset, which is prepared annually by Agriculture and Agri-Food Canada (AAFC)^f. The estimates of land use are prepared using a decision-tree based methodology using a combination of optical and radar satellite imagery and ground-truthing efforts.

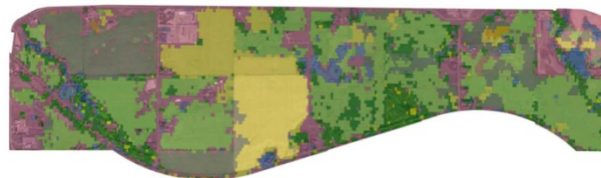
Figure 6: 2015 Remote Sensing Land Use Data



Figure 7: 2016 Remote Sensing Land Use Data



Figure 8: 2017 Remote Sensing Land Use Data



^f Available from the Government of Canada's Open Government portal at <https://open.canada.ca/data/en/dataset/ba2645d5-4458-414d-b196-6303ac06c1c9>

The focus in this AAFC dataset has been on getting an accurate annual inventory of crop maps and accuracy of the dataset in Alberta in 2017 was 94.15% on crop classes. While the accuracy has improved on crop class every year for the last three years, the data is less accurate for classification of non-agriculture land cover, being only 68.46% accurate on average for the province in 2017, for example. The maps are included here for a general overview of regions with development within the LEA, being mainly along roadways and in several areas with subdivisions. They also show the type of crops being grown and the crop rotations, as discussed in the section below.

Crop Rotation

Crop rotations are an important consideration when assessing economic impacts of agriculture. Soils, proximity to livestock-intensive areas and other conditions such as forecast prices for particular commodities affect farming practices. Each crop in established rotations have both diverse basic expected crop output value and contribution margin – thus, the direct economic effect on a region. These rotations for LEA can be observed in Figures 5-7.

Table 8: Area Crop Rotation
(Share of Annual Crop Acreage as Detected by Remote Sensing Analysis)

	Canola	Wheat	Other
2016	33.8%	53.6%	12.6%
2015	57.7%	32.6%	9.7%
2014	29.9%	68.3%	1.8%
2013	64.4%	32.8%	2.8%
2012	22.5%	59.8%	17.7%
2011	53.6%	33.0%	13.4%
Total	44%	46%	10%

This chart clearly indicates that farmers were using a Canola/Wheat rotation over the period analyzed, since other crop types are grown just 10% of the time. Due to the small sample size of annual crops in the LEA, crop rotation information above references the larger Bremner area. The trends observed through remote sensing in the LEA align with the crop rotations shown above, that is Canola/Wheat with occasional other crops.

Expected Livestock Profile

In addition to the fieldcrops, there are a total of 743 acres of pasture based on GIS data for 2016 in the LEA. This constitutes 1.72% of all pastures reported for Strathcona County and is in line with the similar representation of crop production.

The livestock industry is often highly connected with local feed production. We think that the relative resource allocation between the cattle and equine operations observed at the county level holds true for the subject area to a large extent. Therefore, we may expect the LEA to accommodate or affect directly up to 101 cows and 36 horses if indexed using the areas percentage of the total pasture land in the county..

Economic Analysis

As previously discussed, there are two distinct approaches to this analysis. The first involves using provincial level I/O models to calculate the:

- Gross output (of agriculture commodities);
- GDP;
- Labour Income & Employment

The second approach uses a contribution margin calculation to address the fact the I/O model is at the provincial level of aggregation and does not account for re-investment of producers' profits.

I/O Impact Analysis

Economic impact calculations analyze the annual crop/commodity loss that would be otherwise be realized by maintaining the current land use of the subject property and continuing to farm it. We assume that historical farming practices and traditional rotations would continue.

We have provided quantification of the estimated economic impact associated with this change. We calculate it using the I/O model with respective multipliers updated and released by Alberta Treasury Board and Finance (ATBF) in 2017 for the base year 2013 – the most recent update provided by (ATBF).

The multipliers are applied to the total primary commodity production to provide an estimate on the extent that this output creates gross domestic product (GDP) that resides in the province. GDP represents the net flow of commodities at market prices along with the economic value added by labour.

We use Alberta Total Multipliers for basic commodity prices, which account for total economic impact, including the induced effect of additional household spending. Although the multipliers represent economic linkages at the provincial jurisdiction level, it is the most granular level for which they are available, and thus the result should be interpreted as the economic impact the primary agriculture in Bremner area has on the province overall. We think that the upstream and supporting sectors are represented enough at the county level, so the application of the multipliers may be considered in the decision-making process. A decision maker should be aware that such evaluation provides the upper limit to the actual economic impact given that operators farming in Bremner likely spend a portion of their money outside Strathcona County.

A review of historical cropping production we presented in Table 8 for this area suggests that a traditional rotation would involve spring wheat followed by canola. Average yields in the area for stubble seeded crops in black soils range between 60-65 bu/acre for wheat and 45-50 bu/acre for canola.

Given that there are approximately 2,395 cultivated acres in the Local Employment Area as presented in Table 6, this would mean that the annual drop in production would be in the range of 143,700 bu of wheat or 107,775 bu of canola.

It is critical that we use the multipliers for the base year prices since the linkages between interconnected sectors represent that year only. Therefore, we use 2013 pricing for wheat (\$459.99), canola (\$540.94) and cow/calf "Value of Production" (\$820.29 by wintered cow) as reported by Alberta Agriculture and Forestry in Agri-Profit\$ tables for 2013.

In 2013 prices it translates into the total sales of \$1,279,309 consisting of wheat (\$563,079), canola (\$633,381) and beef cattle (\$82,849) produced in the LEA, which was approx. \$534 per cultivated acre in 2013.

It is important to notice that the difference between crop prices in the year 2013 and any other year does not have substantial effect on overall economic impact assessment because the Alberta Treasury and Finance would compute a different multiplier in line with commodity price levels and it does not account for re-investment money. In simple words, say the 2013 average crop price is \$500 per acre. A farmer needs \$300 to cover direct costs and \$150 in machinery, thus it leaves him with \$50 in profit. The 2013 multiplier would take into account \$450 of economic impact. Next year the price drops to \$350 an acre. The farmer covers \$300 in direct costs and decides to apply for a loan for machinery for \$100 and leave \$50 for himself. In 2014 the multiplier would take into account \$400 of economic impact. So even though the crop price changed for \$150, the economic impact would change only for \$50. Thus, the commodity price changes do influence the economic impact but to very limited extent in the short-run.

The analysis is initiated by quantifying Direct and Indirect industry impact first and then proceed with adding household income increase effect (induced) to produce the total economic impact estimation using the I/O closed model.

The economic impact under this model is measured by GDP change if the activity is discontinued indefinitely.

Table 9: Direct and Indirect Industry Annual Economic Impact in Base 2013 Prices

Commodity	Produced Ag Commodities at Base Prices \$	Annual GDP, \$	Annual Labour Income, \$	Employment, FTE	Total Gross Output, \$
Wheat	\$563,079	\$389,087	\$71,511	1.7	\$828,289
Canola	\$633,381	\$437,666	\$80,439	2.0	\$931,703
Beef Cattle	\$82,849	\$34,134	\$20,132	0.9	\$220,628
	\$1,279,309	\$860,887	\$172,083	4.6	\$1,980,620

Table 10: Total Annual Economic Impact Including Induced Impacts in Base 2013 Prices

Commodity	Produced Ag Commodities at Base Prices \$	Annual GDP, \$	Annual Labour Income, \$	Employment, FTE	Total Gross Output, \$
Wheat	\$563,079	\$425,125	\$86,151	2.1	\$888,538
Canola	\$633,381	\$478,202	\$96,907	2.3	\$999,475
Beef Cattle	\$82,849	\$48,715	\$25,932	1.1	\$244,985
	\$1,279,309	\$952,042	\$208,990	5.5	\$2,132,998

It is evident that all performance indicators, including the total economic impact represented by annual GDP, increase between Tables 9 & 10. The total gross output appreciates by approximate \$152,379 and the GDP by \$91,155 (\$952,042 - \$860,887), which is the induced I/O model effect reflecting the new spending by households in line with \$172,083 labour income reported without it. The amounts also consider and account for the spending that occurs outside the county.

Labour income increases as well since it brings additional business to the county. Results suggest that there would be approximately 5.5 full time equivalent (FTE) positions lost if the primary agriculture in the area is discontinued.

Employment in this context represents the estimated number of full-time employees serving the industry. The difference of approximately one FTE - between 5.5 and 4.6 FTE - suggests that the additional induced spending would create slightly less than one full-time job, probably spreading across commercial retail, including grocery stores, and agri-retail.

Total gross output describes the accumulated flow of goods and services within the primary agricultural production and its serving industries such as fuel and seeds. We do not use it to estimate the economic impact since it double counts the input expenditure both in the serving industries and farms.

After the initial application of the multipliers, the results need to be indexed forward to the valuation date of February 2018. This is accomplished using the Consumer Price Index for Alberta from the average of 2013 to February 2018.

We use Consumer Price Index (General Items variety) to adjust the level of price changes. In February 2018 prices, which were 8.4% higher than 2013 average, the annual GDP impact increases to \$1,031,810.

If the agricultural land use were discontinued indefinitely, the annual GDP stream would be reduced by \$10,861,158 overall economic impact under the 9.5% discount rate, which is a recent historical risk-rate for small-size agricultural operations.

Equine operations are very diverse, and therefore we avoided including them into the final calculation without detailed information. Despite the fact that it appears there is at least one equine facility in the LEA, we would not expect them to provide any substantial change to our assessment because the estimated horse herd is significantly less than that of the beef cattle, which in turn has less than 4.5% share in the total economic impact.

Discount Rate

We calculate 9.5% discount rate using weighted average cost of capital (WACC) because both equity and debt components generate the crop and beef cattle revenue streams in our analysis.

$$WACC = R^e * E + R^d * D * (1 - ETR)$$

Where:

- D is portion of debt in the average AB farm operation;
- E is portion of equity in the average AB farm operation;
- ETR is the expected effective tax rate;
- R^d is cost (rate) of debt;
- R^e is cost (rate) of equity.

We used Debt to Equity (D/E) ratio of 15/85 as reported by Statistics Canada in the most recent AB farm financial survey for 2015. We assumed ETR at 40% level.

As per our methodology, average R^d approaches 4.8% over 2009-2016 period calculated using PRIME+2% base.

R^e reaches 12.04% over the same period using Capital Asset Pricing Model (CAPM) which we compute using Bank of Canada marketable bonds with over 10 years to maturity for the risk-free rate and implied equity premium published for S&P 500 by New York University. We use farming/agriculture ungeared betas published by the same source and historical small-size premium published by Dartmouth College, Tuck School of Business.

Income Analysis

Average Rotational Contribution Margin

The Contribution Margin has been used in the net present value calculations to calculate the loss of agriculture value to the county as a whole. We assume that due to the small land base of the subject compared to the entire agricultural land base of Strathcona County, the overall capital costs involved in agricultural enterprise would not change significantly if the subject properties' agricultural use was discontinued.

Based on the crop inventory data, we have used a typical rotation of Wheat/Canola for income analysis purposes. Selected data on these crops from Alberta Agriculture and Forestry AgriProfit\$ program tables is below. This excerpt is from the 2013 dataset for black soils, for which Strathcona County and the Bremner area, in particular, belong as per the Alberta Agriculture and Forestry classification.

Table 11: AgriProfit\$ (2013 – Exhibit)

2013 Production Costs and Returns (\$/acre)

	Stubble Seeded Crops						
<i>AgriProfit\$</i>	Spring Wheat	CPS Wheat	Feed Barley	Malt Barley	Milling Oats	Argentine HT Canola	Field Peas
	2 CWRS 11.5%	1 CPSR	1 CW	Select CW 2R	3 CW	1 CAN	2 CAN
Expected Yield per Acre	65.00 bu	75.00 bu	90.00 bu	75.00 bu	115.00 bu	45.00 bu	50.00 bu
Expected Market Price	7.08 /bu	6.94 /bu	4.57 /bu	5.23 /bu	3.16 /bu	12.02 /bu	7.89 /bu
Crop Sales (\$/acre)	459.99	520.55	411.50	391.90	363.59	540.94	394.67
Direct Expenses:							
Seed, Cleaning & Treatment	28.31	27.76	18.29	20.90	15.81	39.66	47.36
Fertilizer (NPKS blend)	75.50 80-30-10-0	75.50 80-30-10-0	75.50 80-30-10-0	77.00 70-30-20-10	64.00 70-30-0-0	104.50 100-40-15-20	26.50 5-30-15-0
Chemical	32.00 *	27.00	16.00	50.42 *	11.50	24.00	35.80 *
Hail/Crop Insurance	18.30	23.67	16.02	16.02	15.70	24.37	21.05
Trucking & Marketing	13.27	15.31	14.69	12.24	13.30	7.65	10.20
Fuel, Oil & Lube	18.50	16.75	17.50	19.25	12.25	19.00	24.00
Machinery Repairs	17.25	17.00	11.50	16.75	11.50	15.25	17.75
Building Repairs	2.00	5.00	2.00	5.50	2.75	2.25	4.50
Custom Work	2.00	2.00	2.25	3.00	14.50	2.50	8.25
Labour (Paid and Unpaid)	18.00	22.00	14.50	23.50	19.50	18.50	22.00
Utilities & Miscellaneous	11.50	13.50	8.50	17.75	12.00	10.50	15.25
Operating Interest	6.79	6.51	5.49	7.42	4.57	8.41	5.48
Total Direct Expense	243.41	252.00	202.24	269.76	197.37	276.59	238.15
Contribution Margin	216.58	268.55	209.25	122.14	166.21	264.35	156.52

Historical costs and crop pricing from 2012 through 2016 were used to estimate the average Contribution Margin for the Local Employment Area and this can be observed in Table 12. The suggested crop rotation would result in \$184 and net profits at \$66 per acre under the 44%/46% rotation calculated in Table 8. Please note that Table 11 only provides a one-year example of the information available from Agri Profits, that we used for I/O model and it is the average for the period that was used for contribution margin analysis as previously stated. We used the information up till 2016 since it was the last most recent year for which we had all the information on crop rotations, yields and beef cattle estimations available.

Given that there are approximately 2,395 cultivated acres in the subject lands, the aggregate annual Contribution Margin accumulates at \$440,921 and Net Profit at \$158,598. These yearly benefits translate to \$4,865,333 and \$1,808,133 respectively under the 9.5% discount rate if these crop operations are discontinued indefinitely.

Table 12: Excerpts from AgriProfit\$ for Wheat and Canola per Acre

	2012	2013	2014	2015	2016	Average
Wheat	\$ 247.42	\$ 216.58	\$ 74.89	\$ 124.50	\$ 123.71	\$ 157.42
Canola	\$ 308.65	\$ 264.35	\$ 148.38	\$ 163.69	\$ 174.90	\$ 211.99
Contribution Margin	\$ 277.35	\$ 239.93	\$ 110.82	\$ 143.66	\$ 148.74	\$ 184.10
CAPEX	\$ 117.25	\$ 109.75	\$ 116.72	\$ 122.84	\$ 122.84	\$ 117.88
Net Profit	\$ 160.10	\$ 130.18	\$ (5.90)	\$ 20.82	\$ 25.90	\$ 66.22

Livestock Operations

Similar calculations performed for the beef cattle sector indicate that the annual contribution margins in the LEA aggregate to approximately \$16,981 for the 101 cows this area was estimated to have an effect on, while the net profits reach \$10,510, which translates to \$178,749 and \$110,632 respectively under the 9.5% discount rate if these beef cattle operations are discontinued indefinitely.

Together with crop farming, the total value of contribution margins attributable to agriculture is \$4,820,022 and the total net profits in the area are \$1,780,089.

Table 13: Excerpts from AgriProfit\$ for Beef Cattle per Farm

	2012	2013	2014	2015	2016	Average of Years
Average Farm Size (wintered cows)	198	205	217	190	167	192
\$/Cow Wintered						
(A)						
1. Weaned Calves	715.59	843.54	1,465.08	1,350.33	977.86	1,027.53
6. Cull Cows/Open Heifers	158.91	147.13	296.40	272.13	204.95	208.34
7. Bulls	25.87	20.33	42.32	32.47	29.12	29.03
8. Bred Cows/Bred Heifers	16.14	20.56	9.88	19.34	57.93	26.30
9. Miscellaneous Receipts	0.12	0.59	0.00	1.21	24.63	5.96
10. Government Programs	0.00	0.12	0.29	6.02	11.23	3.87
11. Inventory Adjustment	87.01	94.14	93.07	18.04	-83.55	35.99
12. Less: Cattle Purchases	274.66	306.12	475.53	791.90	420.09	448.12
Value of Production	728.99	820.29	1,431.51	907.63	802.08	888.90
(B)						
1. Winter Feed	265.77	274.04	330.47	307.40	390.01	312.35
2. Bedding	11.67	19.25	10.26	16.48	19.00	15.59
3. Pasture	218.16	194.82	273.70	232.04	240.99	228.85
4. Veterinary & Medicine	18.49	20.66	22.93	26.55	30.55	23.89
5. Breeding Fees/Bull Rental	0.73	0.45	0.00	3.41	0.10	1.01
6. Trucking & Marketing Charges	12.15	15.31	16.67	21.03	17.04	16.30
7. Fuel	13.95	16.08	19.62	14.08	20.34	16.53
8. Repairs - Machine	11.47	12.26	15.04	11.90	23.07	14.78
9. Repairs - Corrals & Buildings	4.41	8.97	6.45	10.54	10.74	8.25
10. Utilities & Miscellaneous Expenses	15.33	18.47	18.44	26.41	38.52	23.90
11. Custom Work & Specialized Labour	5.75	3.28	6.20	7.86	2.62	5.08
12. Operating Interest Paid	1.01	0.63	1.28	2.78	3.10	1.82
13. Paid Labour & Benefits	13.26	7.90	10.85	14.38	22.20	14.20
14. Unpaid Labour	31.47	35.16	38.14	34.95	51.31	38.22
Variable Costs	623.61	627.29	770.04	729.79	869.58	720.77
(C)						
1. Share/Lease Cattle Payments	1.99	11.59	0.00	3.19	0.04	3.36
2. Taxes, Water Rates, Lic. & Insurance	7.95	9.57	8.63	10.16	12.42	9.82
3. a) Equipment & Building Depreciation	34.94	33.47	34.11	46.52	67.23	44.30
b) Lease Payments	1.00	3.01	2.66	0.31	6.90	2.77
4. Paid Capital Interest	3.70	3.47	2.23	3.51	5.43	3.82
Total Capital Costs	50	61	48	64	92	64
(D) Cash Costs (B+C-B14-C3a)	606.78	619.77	745.42	712.01	843.05	702.32
(E) Total Production Costs (B+C)	673.18	688.40	817.67	793.48	961.58	784.84
(F)						
Gross Margin (A-D)	122.21	200.52	686.08	195.62	-40.96	186.58
Return to Unpaid Labour (A-E+B14)	87.27	167.05	651.98	149.09	-108.19	142.28
Return to Investment (A-E+C4)	59.50	135.36	616.06	117.65	-154.08	107.88
Net Return (A-E)	55.80	131.89	613.83	114.15	-159.50	104.06

Conclusion

Our analysis suggests that the total Agricultural Economic Impact for the Local Employment Area falls within the **range of \$4,641,273 (Contribution Margin approach) to \$10,861,158 (I/O Model approach)** with provincial level multipliers.

It is important to note that the Contribution Margin approach accounts only for the part of upstream and supporting industry effects the agricultural operations in the LEA would have. Given that there are obviously additional economic impacts, **we recommend using the \$10,861,158 as the estimate** of the overall agricultural impact that the Local Employment Area has at the County level. This represents approximately 0.0036% of Alberta's Gross Domestic Product of \$304.7 billion^g.

This may appear optimistic given the fact that the Alberta Treasury and Finance calculated multipliers for the whole province and some upstream businesses located elsewhere in the Alberta are not present in Strathcona County. At the same time, the I/O model does not account for the induced impact of business profits that farmers may re-invest into farming operations or other business expansions in the county over time. Our profitability analysis indicates that the farmers have this opportunity but there is not enough information to quantify such effect and we leave it outside the scope of this report. These two limitations of the I/O model mitigate each other while the model provides the most comprehensive conclusion with information available.

^g Statistics Canada, Table: 36-10-0402-01 (formerly CANSIM 379-0030). With the valuation year 2018 not being complete, the GDP at basic prices at the end of 2017 is deemed to be the best comparator at \$304.7 billion. The five-year trend would lead to a very similar result at \$299.4 billion (also 0.0036%).

Appendix D Proposed Topsoil Conservation and Management Plan

Introduction

This plan is intended to provide guidance on topsoil conservation and management when developing in LEA.

Context

As identified in the LEA Agricultural Impact Assessment, all topsoil removed during the conversion of land from agricultural to business employment/commercial/light industrial must be managed. Topsoil disposal in areas adjacent to LEA has been identified as a primary negative impact of the land conversion and development. Additional negative impacts of excess topsoil disposal include, but are not limited to:

- unpermitted site grading
- drainage alterations
- wetland infilling
- agricultural soil degradation
- crop/soil disease transmission
- road damage from unpermitted hauling
- noise, dust and vibration disturbances to adjacent residents and farming operations

Topsoil Conservation Guidelines

Where possible, topsoil should be left undisturbed. Areas that are to be conserved such as Environmental and Municipal Reserve Lands are ideal places to limit stripping and grading activities that would disturb soils.

Topsoil Management Guidelines

Low Impact Development practices include increasing topsoil depths throughout the entire development with the intention to improve surface water quality, reduce water consumption and improve stormwater systems but those same practices also work to conserve and manage topsoil removed during development. The following topsoil conservation techniques (or BMPs) have been applied in other jurisdictions with success:

- Minimum of 300 millimetres of topsoil to be placed on expected turf areas which includes but is not limited, to front and side lot landscaping, open spaces, road rights of way and stormwater management facilities.
- Minimum of 600 millimetre of topsoil to be placed in tree and shrub planting beds.

Current vs. Proposed Standards

Category	Current Strathcona County Design and Construction Standards (2011)	Proposed LEA Design and Construction Standards
Definition	Topsoil to be fertile agricultural soil, capable of sustaining vigorous Plant growth, free of subsoil, clay, stone, lumps, noxious odor, roots, other foreign matter except for native soils where seed base or roots may be used for re-establishment of natural vegetation cover and approved by Contract Manage/Developer Representative	As identified by the Canadian System of Soil Classification, topsoil, identified as the A, L, F, H and O layers, is the uppermost horizon of soil that is capable of growing and supporting vegetation. Topsoil contains the essential nutrients, microorganisms, organic matter and other physical characteristics needed grow and sustain permanent vegetation.

Stripping	<p>The Contractor shall remove the topsoil and stockpile it separately in accordance with the following: The Contractor shall salvage the topsoil, subsoil and overburden in a manner, which prevents contamination of one material with another. A minimum distance of 1m is required between stockpiles of different materials. The materials shall be stockpiled separately in a safe and accessible location as approved by the Contract Manager/Developer Representative.</p> <p>Topsoil may consist of two distinct layers. The blacker layer shall be stockpiled separately from the lower brownish layer. The Contractor shall consult with the Contract Manager/Developer Representative who will determine if separate salvage and stockpiling is required. The Contractor shall suspend the salvage and stockpiling of topsoil and subsoil materials when excessively wet, frozen or other adverse conditions are encountered. These operations shall remain suspended until field conditions improve or the Contract Manager/Developer Representative approves alternate procedures.</p>	Same or similar to current.
Depth	<p>150 mm for seeded areas; 100 mm for sodded areas; 450 mm for flower beds; 450 mm for shrub beds; and 200 mm for sport fields.</p>	<p>300 mm for seeded areas; 300 mm for sodded areas; 450 mm for flower beds; 600 mm for shrub beds; and 300 mm for sport fields.</p>
Compaction	No current standard	<ul style="list-style-type: none"> - Do not place topsoil when frozen, excessively wet, extremely dry, or in a condition inhibiting proper grading, cultivation, or compaction or otherwise in a condition detrimental to the work or topsoil integrity - For topsoil depths greater than 300 mm, place topsoil in maximum 150 mm lifts and compact with appropriate weighted landscape roller where applicable. Landscape rollers are not recommended for naturalization areas as micro-topography is recommended. - Placed topsoil shall be allowed to settle or shall be lightly compacted such that it is firm against deep footprints prior to planting,

		seeding or sodding. Compaction shall not be more than necessary to meet this requirement. - Topsoil shall be placed and spread with appropriate low impact equipment and in a manner that does not adversely affect its structure. - Remove roots, weeds, rocks, and foreign material greater than 50mm in diameter while spreading. *adapted from City of Edmonton's Design and Construction Standards (Volume 5 Landscaping)
Soil Property Testing	Sand - 40% +/- 3% by dry mass Clay - 30% +/- 3% by dry mass Silt - 30% +/- 3% by dry mass Organic Matter 6–10% by dry mass Toxic Chemicals None pH Value 6.0 – 7.5 EC - Max 1.5 mhos/cm ² Nitrate Nitrogen 10-20 ppm Phosphorus 10-60 ppm Potassium 80-250 ppm	Same or similar to current. Variances should be granted to accommodate soil properties in Bremner without having to add amendments under most circumstances.

Clubroot

Clubroot management plans must be taken into consideration when doing topsoil management planning. Please note that clubroot contaminated soil must be managed onsite or landfilled. It is appropriate to use clubroot contaminated soils for uses such as turf fields and boulevards.

Other Considerations

If there is insufficient topsoil, variances may be granted to the developer and home builders so that topsoil does not have to be imported.

If excessive topsoil exists that cannot be used during development alternatives may be considered on a case by case basis.

References

Alberta Low Impact Development Partnership. 2016. Alberta Clean Runoff Action Guide (preliminary draft July 2016)

Okanagan Basin Water Board. The Partnership for Water Sustainability in BC. 2012. Topsoil Bylaws Tool Kit: An Appendix to the Green Bylaws Toolkit

Young, D. Morrison, C. (2012) Soil Management Best Practices Guide for Urban Construction [PowerPoint slides]. Retrieved from <https://trieca.com/app/uploads/2016/07/Soil-Mgmt-Guideline-Mar-28-2012.pdf>

City of Edmonton. (2014). Low Impact Development Practices Best Management Practices Design Guide Edition 1.1.

Cook, J. City of Vancouver. 2016. Top Soil Requirements In Vancouver: The Need, The Benefits, And The Next Steps.

City of Edmonton. (2017). Design and Construction Standards Volume 5: Landscaping.

Ritter, J. Ontario Ministry of Agriculture, Food and Rural Affairs. 2016. Factsheet: Importation of Soil onto Agricultural Land.

Case Studies and Examples

Currie Barracks Calgary <http://albertawater.com/alberta-water-blog/2581-low-impact-development-and-flooding-a-drop-in-the-bucket-by-leta-van-duin>

Village of Alix <http://lombardnorth.ca/project/sustainable/>

Box Grove, Ontario http://www.latornell.ca/wp-content/uploads/files/presentations/2016/Latornell_2016_T3F_Dean_Young.pdf