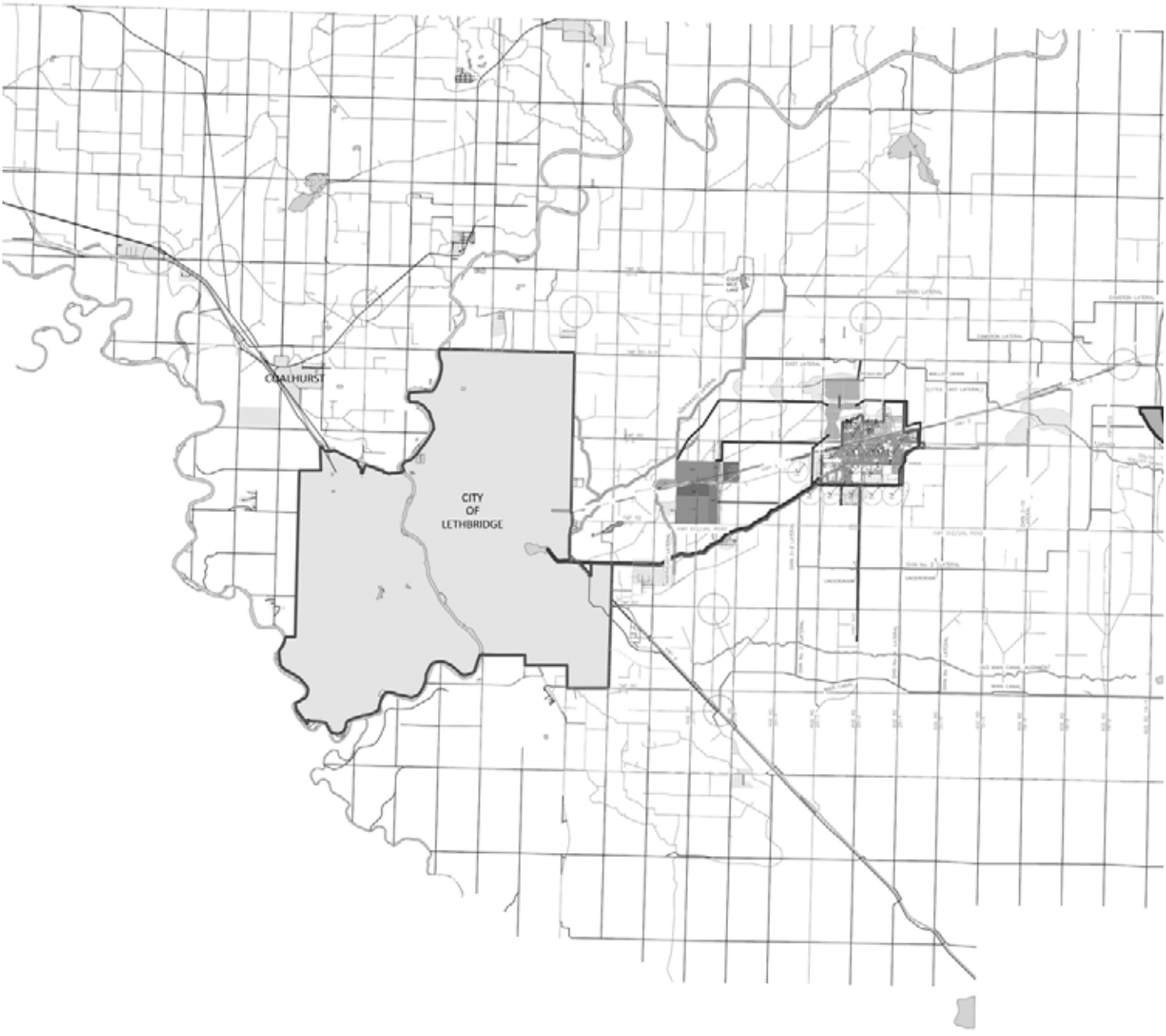
IDS Integrated Development Strategy

Coaldale, County of Lethbridge



Water. Water Everywhere

Coaldale, County of Lethbridge

Town of COALDALE
A Wise Choice

Alberta
Freedom To Create. Spirit To Achieve.

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Integrated Development Strategy

Executive Summary

LAND USE EXECUTIVE SUMMARY

Background

The economic development of the Lethbridge & Coaldale regional area has been constricted by the area's frequent flooding problems. The primary focus and motivation for the Integrated Development Strategy is first to solve the area's flooding issues, turning a storm water problem into a water management asset. The result of this will not only provide an opportunity to utilize and manage water to the advantage of local industry and residents, it also releases pent-up development pressures, particularly in anticipation of the future Canamex corridor. Currently there is no clear plan for how this growth should take place.

The Land Use component of the IDS seeks to provide an innovative, overarching plan for the Coaldale/Lethbridge corridor to maximize servicing efficiencies, protect the environment, pursue economic development opportunities, and guide the sustainable growth of the region.

A Process to Balance Interests

To strike a balance between the many competing regional interests along the Highway 3 corridor, a multi-day public workshop (charrette) was conducted. Guided by the Smart Growth and Sustainability Policies for the County and the Town, the workshop provided a venue to bring key stakeholders to the table in order to help shape an integrated plan aimed at the broader goal of regional economic growth. Issues that were addressed include:

- The Distribution of Land Uses
- Contiguous Corridor Growth
- Mobility Along Highway 3
- The Future Old Highway 3
- Repositioning the Broxburn Business Park
- Low Density Residential in the County
- The Canadian Pacific Rail Corridor
- Town Growth

The Sub-Regional Plan

The land use plan addresses development at a number of scales. At the Sub-Regional scale, a rationale provides for a more predictable, yet flexible outcome for the subregion encompassing the Highway 3 corridor east of Lethbridge and all the flood-affected areas including and surrounding the Town of Coaldale. Key to the proposed concept is the concentration of growth into development clusters set within a clear regional structure of corridors and preserved agricultural countryside.

Subregional Structure: Corridors

1. Highway 3: The primary structuring element of the sub-region.
2. Canadian Pacific Railway Corridor: The existing railway corridor creates both a vehicular constraint to the north, and an opportunity for abutting industrial uses as rail transport becomes increasingly demanded.
3. Canamex & Highway 3: As the Canamex is built, it will create a significant crossroads at the intersection of Highway 3. While the result of this will allow municipal control of Highway 3 , it also defines a traffic bypass around both Coaldale and Lethbridge.
4. The Coaldale Crossroads: A key concept for the Town's growth strategy, the interchanges with the Canamex and Highway 3 realignment will emphasize the intersection of old Highway 3 and Highway 845 (20th Street) as an increasingly important crossroads within the Town.

5. Regional Pathway: The proposed regional pathway will create an important link between the Town of Coaldale and the City of Lethbridge.

Subregional Structure: Clusters & Countryside

As a widespread human pattern, towns and cities exhibit an innate wisdom of "clustering" development for collective benefit of social interaction, commerce, efficient infrastructure, identity, and economic development. Built on the framework of the regional corridors, three distinct development clusters are identified along the highway 3 corridor. These include the City of Lethbridge and contiguous County development (no recommendations are proposed), The Town of Coaldale to the east, and between the two at the intersection of the future Canamex corridor, a proposed "Country Agricultural-Industrial Centre".

Maintaining Countryside

Key to the clustering concept, a rationale is established to maintain the central Country Agricultural-Industrial Centre as a freestanding cluster separated by City and Town by a natural/agricultural greenbelt. While county residential growth outside of the clusters is discouraged, a strategy for smaller residential clusters is proposed to mitigate the effects of low-density residential.

County Agricultural-Industrial Centre Plan

Located midway along the Highway 3 corridor at the convergence of the Canamex and Canadian Pacific Railway, this cluster promises to become an important intermodal hub for agricultural business and industrial operations.

As an identifiable cluster, the area can be marketed and developed to the benefit of the greater region. This cluster would include Broxburn serving as an intense business centre to the complementary rural industrial uses to the north and south. A Highway Service area to the northeast of the planned interchange would provide a variety of highway commercial and other uses to the traveling public.

Coaldale Town Plan

Responding to the town's guiding Smart Growth policy, the "Neighbourhood Unit" pattern is proposed to shape and guide future growth. Measured as a 5-minute walk from center to edge, (about a quarter section in size), the Neighbourhood Unit establishes a flexible, yet predictable pattern to guide sustainable future growth under a number of market conditions, and is responsive to changing circumstances. With the Neighbourhood Unit as the primary increment of growth, a Town growth strategy prioritizes future growth areas and the level of adherence to the ideal "Neighbourhood Unit" pattern.

Characteristics of the Ideal Neighbourhood Unit:

- **Compact:** It doesn't waste space and is at an appropriate density for social, economic, and environmental sustainment;
- **Walkable:** Streets are connected, there is a destination for pedestrians, and vehicles are balanced with pedestrian mobility; and
- **Complete:** The neighbourhood has a range of, land uses, open space types, and housing types accommodating a range of incomes and ages.

Guiding Town Growth with the Neighbourhood Unit:

- **Tier 1: Traditional Town Centre:** With existing infrastructure in place, the traditional town centre has the top priority for future growth and is well situated to achieve an ideal neighbourhood unit pattern.
- **Tier 2: Currently Approved ASPs** More recently approved automobile-oriented subdivisions should be completed, but should be incentivized for ASP amendments that align them more closely to the pattern of the Neighbourhood Unit.
- **Tier 3: Immediate Urban Expansion:** Logical expansion by the increment of the Neighbourhood Unit based on the Town's major corridors- including the Town's crossroads proposed in the Sub-Regional Plan, proximity to existing infrastructure and services, and other factors.
- **Tier 4: Future Urban Expansion** Future expansion by the Neighbourhood Unity following substantial build-out of Tier 3, held to the full standards of the model Neighbourhood Unit.

Additional Town Development

- **Northeast Industrial:** The Town's industrial development to the northeast may expand further to the north, and should protect rail access.
- **Northwest Water Management Centre:** Building from the existing Birds of Prey wetlands area, the northwest sector will be a sub-regional center for the areas' progressive water management system.

Transportation

Exiting Transportation Network - Corridor and Study Area

The existing road network includes;

- Provincial Highways; Highway 3, Highway 4, Highway 512 and Highway 845,
- ***It should be noted that both Highway 3 and Highway 4 within the Study Area form part of the CANAMEX Trade Corridor, the Transportation Corridor connecting Canada, the United States, and Mexico.***
- Local Grid Road System; It should be noted that the local grid road system is not continuous throughout the Study Area.

A number of transportation network studies have been completed for this area including:

- *Functional Planning Study – Future Highway 4 Interchange with Existing Highway 3:10* – Focus April 2008,
- *Highway 3:10 Operational Review/Scope Study - Lethbridge to Coaldale* - McElhanney Consulting Services Ltd., May 2004,
- *Highway Network Study Lethbridge to Coaldale* – ADI Limited, November 2009,
- *Highway 3:10 – Lethbridge to Coaldale Service Road Network Study* – ISL Engineering March 2009.

In addition, Alberta Transportation (AT) has carried out a Functional Planning Study for the realignment of Highway 4 east of Lethbridge and a Functional Planning Study for the City of Lethbridge North Ring Road.

Results of and recommendations made in the above studies were used in the development of the preliminary skeletal transportation network concept for the Study Area.

Based on the results of the Transportation Studies and review of the long term plans for the area, the future long term skeletal network was identified for the area and it includes; the existing transportation network, the proposed realignment of Highway 4 east of the City of Lethbridge, North Ring Road and the proposed access schemes for Highway 3, Highway 4 and North Ring Road within the confines of the Study Area.

Access Management

The transportation network in the Study Area is under the jurisdiction, management and control of three Road Authorities; Alberta Transportation is responsible for the numbered highways, the County of Lethbridge is responsible for the local network and the Town of Coaldale is responsible for the street system within the Town's boundaries.

Therefore the existing access management scheme in the case of Provincial Highways is defined by the *Alberta Transportation Access Management Guidelines*, the local road system is under the jurisdiction of the County of Lethbridge while the Town of Coaldale is responsible for the access control as related to the Town's street system.

The future access management scheme in the case of the skeletal network was identified following the analysis of the results of the transportation studies and review of the future functional designation of the network links;

- Access to Highway 4 and North Ring Road will be provided at the identified interchange locations.
- Access to the existing Highway 3 alignment will be limited and will be provided at signal controlled intersections.
- Access to the lands north and south of Highway 3 located along the existing Highway 3 will be provided by the local road system.
- Spacing of the intersections located north and south of the Highway 3 should be adequate to provide

for accommodation of queues and proper operation of the CP line crossings.

- Access to lands abating Highway 3 should be provided via the service road system connecting to N/S Highway 3 connectors.
- Modern roundabout intersection layouts should be pursued as the first configuration option before the traffic signal control is considered.
- All key standard four legged and "T" type intersections should be flared and include a bypass lane(s) in their configuration.

Network Concept for the Proposed Development

The results of the analysis of the future transportation network supported location of the nodal development along the existing Highway 3 alignment. To accommodate the proposed development node and provide for efficient vehicular traffic circulation, intensification of the future network in the area will be required. The proposed modification of the network following completion of the development node includes introduction of the collector road system to the east and west of the future Highway 4 alignment, connecting future development to the original skeletal road system. The proposed collector road system supports identified long term access management scheme.

Pedestrian and Bicycle Accommodation

To accommodate other modes of transportation such as bicycles and pedestrian a pedestrian bicycle trail system was developed. It will provide a pedestrian/bicycle connection between the City of Lethbridge and the Town of Coaldale along the private lands and SMRID canal, with direct connections to the proposed development node and the Alberta Birds of Prey Centre. The crossing of the future Highway 4 alignment will be accommodated as part of the SMRID canal crossing. An additional crossing of the Highway 4 Alignment is proposed at the future Highway 3 interchange.

Stormwater Management

Rather than viewing stormwater management as a liability and a nuisance, it can be transformed to become a catalyst that will attract investment, beautify a community, increase tourism, protect the environment, and create recreational and other opportunities. The Town of Coaldale and the County of Lethbridge are facing the need to think creatively about how they approach stormwater management as flooding events such as those seen in 1978, 1995, 2002, 2005 and 2010 have become an increasing threat to the region and current infrastructure is insufficient to manage large storm events. In addition, an increasing population and pressure to develop lands in the region have helped to create the impetus to successfully manage stormwater on affected lands.

Recognizing in 2009 that the solution to the region's flooding problem was not something which could be handled in isolation, the Town of Coaldale and the County of Lethbridge initiated the Integrated Development Strategy (IDS). One of the main goals of the IDS is to develop a concept plan for the region's stormwater management in conjunction with plans for future water supply, wastewater treatment, land use planning and economic development goals. Various opportunities have been identified for integrating water reuse, education and recreation into the stormwater management facilities, with the primary goal being storage for severe flood events and drought conditions.

Together, the Town and County recognize that if done right and in a comprehensive fashion, they can become recognized leaders in water management, a "Best Practice" for others to follow.

The project team began by exhausting all sources for relevant information, including reports, topographic mapping, interviews with local authorities, agencies, residents and other stakeholders. Field visits were undertaken in order to confirm drainage boundary conditions, problem areas within the catchment and potential stormwater management enhancement areas. Meetings were held with members of the consultant team to coordinate efforts and encourage working aspects of overlapping scopes into the report such as land use planning, transportation planning and others. Case studies were explored to demonstrate water reuse options, water quality impacts on infrastructure and successful stormwater management practices in the region.

Based upon the data collected, a long-term conceptual strategy was developed which can be phased into the region in stages. The concept consists of:

- Force main to the Oldman River from a reservoir located at the Birds of Prey Facility (Ultimate reservoir will be 3.2 million m^3.

- Connect to Coaldale's existing stormwater infrastructure via the Main East Storm Pond and the industrial storm pond.
- Utilize the abandoned raw water reservoirs for additional storage and connect them to the Main East Storm Pond.
- Additional development on the south edge of Coaldale can link into the connection at the abandoned raw water reservoir.
- Future development at Broxburn Business Park and in the proximity to the intersection of Highway 3 and the future CANAMEX Highway are to be water-reuse based sites

The following recommendations were made:

- Lands for the expansion of the Birds of Prey or frequently inundated areas are acquired to secure location for storage of runoff
- Forcemain alignments noted in the report are confirmed and protected by easements
- Funding strategies are initiated simultaneous with implementation studies
- Broxburn Business Park is allowed to proceed with integrated water management system to demonstrate locally that self-sustaining developments for industrial parks can be made possible
- Local standards for the County of Lethbridge and Town of Coaldale be amended to encourage and allow stormwater harvesting and reuse noting that current legislation may not be comprehensively supportive of these initiatives
- Continue communications with Alberta Transportation related to force main alignments crossing and/or running parallel with existing and future transportation networks
- Runoff at future interchanges and intersections at major roadways be integrated with potential nearby highway commercial developments

WATER SUPPLY AND WASTEWATER TREATMENT

This section of the report involves the design of an Integrated Water Management Strategy for the water supply, wastewater treatment and effluent management systems for all future residential, commercial, and industrial growth within the Town of Coaldale and the County of Lethbridge. This includes identification of an alternative raw water supply for commercial and industrial users within the County of Lethbridge as this group of users is presently not provided with water from the City of Lethbridge's water supply. This alternative raw water supply could be obtained from a number of sources including rainwater harvesting, stormwater storage ponds and groundwater supplies created by recharging aquifers with storm water or high quality treated effluents.

It is suggested that aggressive water conservation practices be implemented for all future residential, commercial, and industrial growth in the study area. Emphasis should be placed on reducing demand on potable water supplies and industrial water supplies. This can be accomplished by requiring consumers to use smart water meters, low flow fixtures, point of use water heaters and low consumption appliances. Water reuse should also be encouraged and this can be accomplished by requesting consumers to collect and treat grey water for toilet flushing and other utility service functions.

The majority of the water supply for residential users in the study area is presently being provided by the City of Lethbridge. This potable water supply is distributed by the Lethbridge Regional Water Services Commission (LRWSC) to the Town of Coaldale and the County of Lethbridge Rural Water Users Association with the Town allocated 9,990 m3/d and the County, 8,500 m3/d. The County's allocation includes the supply of up to 7,600 m3/d of water for the McCain's food processing plant.

It is assumed that the supply and delivery of potable water to the Town of Coaldale as well as residential units having access to the County of Lethbridge Rural Water Users Association will continue in the future. It is also assumed that the water supply for industries and commercial facilities within the Town of Coaldale will continue to be supplied by the Town of Coaldale; however, water supply from the City of Lethbridge for industrial and commercial users within the County of Lethbridge must be approved on a case by case basis. Since it is not feasible to rely on the City of Lethbridge for the supply of water for industrial or commercial facilities within the County, it is proposed that the water supply and water for fire protection for industries and commercial facilities within the County be

supplied from existing or newly constructed stormwater retention ponds.

For Broxburn Industrial Park, the stormwater pond and the infrastructure for fire protection have already been installed. Water to be supplied from the stormwater pond for the industrial users, will have to be treated to the quality required by the specific industrial clients. The technology exists today to provide the treated water on a just-in-time basis rather than constructing a water treatment plant which will provide potable water for all future industrial clients in the industrial park.

Infrastructure similar to that provided by Broxburn Industrial Park will have to be installed for other industrial and commercial users in the County. It is proposed that the industrial water supply for industrial process water and fire protection be taken from the network of stormwater retention ponds with treatment of the water to the quality required by the individual users. It should be assumed that the capital and operating costs for the stormwater storage ponds, the water treatment plant(s), the fire protection system and the wastewater treatment and effluent disposal system will be paid by the owner of the industrial park.

The Integrated Water Management Strategy, proposed in this study, will ensure that there will be an adequate raw water supply from the stormwater retention ponds even during extended drought periods. Excess water from the holding ponds in each of the industrial parks will be pumped to the major holding/storage area located within the expanded Birds of Prey facility. If there is a requirement for water during an extended dry period, water can be pumped back from the major holding/storage area into the holding pond(s) at the industrial park. This water supply will be of a quality similar to SMRID's irrigation water and thus, requires treatment prior to being used by the commercial and industrial clients.

The water usage in the Town of Coaldale is currently approximately 300 litres per capita day (lpcd). By using water saving techniques, this could be lowered to an estimated 100 lpcd or 80 lpcd if grey water reuse is utilized. The 100 lpcd does not include any water use outside of the house for watering grass and gardens and thus, for all new subdivisions within the Town of Coaldale, a separate utility water supply, providing untreated stormwater, would have to be provided for watering lawns and gardens from one of the storm water ponds. By decreasing water consumption from approximately 300 lpcd to 100 lpcd for all new subdivisions, the Town of Coaldale's existing water supply allocation of 9,990 m3/d from the City of Lethbridge should be adequate for the next 50 years. This water conservation program will decrease the amount of wastewater generated per capita per day and thus have a positive impact on the future design capacity of the wastewater treatment plant.

Water consumption by future industrial clients has not been factored into these estimates. As long as the consumption rates for the new industries are low, which is typical of the present industrial consumers within the Town, the present water supply from the City of Lethbridge will be adequate. If a food processing plant similar to the McCain Foods plant with a high water demand was to locate within the Town's boundaries then the water supply and the wastewater treatment requirements would have to be reassessed. For those industries requiring only utility grade water supplies, provisions could be made to supply water from the Integrated Water Management Strategy major water storage facility, which would have a significant impact on the total volume of water consumed from the Town's potable water supply system.

Wastewater treatment and disposal is a key issue when contemplating land development projects. In the past, the accepted approach was the construction of an extensive sewage collection system and a centralized wastewater treatment plant with a design period of 20-30 years. There is a realization that a network of decentralized treatment plants constructed on a just-in-time basis as modular treatment units, is a more appropriate and cost effective solution for new land development initiatives. Wastewater treatment process configurations should be selected which have the capability of creating a product achieving drinking water quality standards and thus, effluent disposal will be replaced by product reuse or recycle criteria. The water produced by the treatment plant can be reused by industrial users within the park, disposed of in engineered wetlands, or used for aquifer recharge or aquifer storage. As a result, wastewater management will become an integral component of the Integrated Water Management Strategy developed to manage stormwater, water supply and wastewater recovery and reuse for the Integrated Development Strategy.

The study team suggests that each of the industrial parks established in the County of Lethbridge have their own wastewater treatment and effluent management system. The wastewater treatment plant and effluent disposal system must be planned, designed, approved, constructed and operated by the owner of the industrial park. The wastewater treatment plant must be designed to meet all of the minimum effluent standards established by Alberta Environment and the design approved by Alberta Environment prior to initiation of construction.

Broxburn industrial park should be used as the example of what each of the industrial park owners must pro-

vide. With the exception of a water treatment system, and the wastewater treatment and effluent disposal/reuse system, the infrastructure for the industrial park is in place. With the stormwater pond interconnected with the Integrated Water Management Strategy's major water storage facility, the storage pond on the Broxburn property is likely larger than it would have to be. Water and wastewater treatment are not an issue; however the design and approval of the disposal/reuse system is new to Alberta Environment and approval will be a challenge. The capital and the operating costs for the management of the wastewater and other wastes generated within the industrial parks should be the responsibility of the industrial park owner or their designated utility services provider.

For the Town of Coaldale's wastewater treatment plant, Alberta Environment's most recent approval to operate was issued on October 13, 2006 and expires on October 1, 2016. When the treated wastewater effluent is discharged to the Oldman River, the only parameter which must be measured is cBOD5 (carbonaceous 5-day Biochemical Oxygen Demand) which must be ≤ 25 mg/l as a monthly arithmetic mean of weekly grab samples.

The wastewater quantity is a major problem as during extended wet weather events the daily flows to the plant can be significantly higher than the treatment plant design flow. On June 17, 2010, the daily flow to the plant was measured at 25,894 m3/d, which was in excess of 10 times the average daily flow for the year. Efforts have been made to reduce the inflow and infiltration (I & I) to the sanitary sewers; however, in the older areas of the Town the I & I continues to be a major problem. It is anticipated that the major contributor is sump pumps in perimeter drains and without storm sewers, there is no place other than the sanitary sewer to dispose of this water.

The sewage from the Town of Coaldale flows by gravity sewers to a lift station located in the northwest quadrant of the Town. The lift station has 4 - 60 HP pumps capable of pumping a total flow of 30.3 m3/min or 43,600 m3/d to the headworks of the WWTP which is a 4 cell aerated lagoon system with a fifth cell for effluent storage. The treated effluent is pumped through a 12 km 300 mm diameter forcemain to the Oldman River. The current maximum capacity of the river outfall is 2,390 m3/d with one pump operating and 3,110 m3/d with both pumps operating.

The WWTP plant is described in a plant upgrade study report entitled "Town of Coaldale Wastewater Treatment and Disposal Study" prepared by MPE Engineering Ltd. and submitted as a Draft report on December 15, 2005. This report provides a detailed description of the plant and the plant's deficiencies. The Executive Summary states that "Study findings indicate that the projected demands and environmental regulations are such that current municipal wastewater treatment and disposal facilities with modest upgrades will be adequate." As the study period was 20 years, if this statement is correct then there will be no requirement to upgrade the plant to achieve nutrient control and effluent disinfection when the plant's approval to operate is renewed in October 2016.

The modifications proposed are extensive and will only provide an effluent which will continue to achieve the cBOD5 limit when it is a known fact that nutrient removal and disinfection of effluents is becoming the accepted standard especially for the discharge of effluents to rivers that are being used as drinking water supplies. In fact the draft 2010 Environment Canada WWTP effluent guidelines include chemicals of emerging concern in the proposed monitoring requirements.

If the existing aerated lagoon system was replaced with a biological nutrient removal (BNR) system capable of removing the nutrients and providing a disinfected effluent, the cost would be approximately $15 million. Unfortunately the BNR technology would not be able to handle the flow variations which are being encountered and thus, a solution to the I & I problem would have to be implemented prior to introducing this high rate technology.

It is suggested that during the five years prior to the renewal of the approval to operate for the Town's WWTP, that two studies be undertaken. The first study should involve the development and implementation of a program to address the serious I & I issue which exists in homes constructed before the year 2000. The focus should be on the development of techniques and procedures which would provide options to collect this clean water and dispose of it in the expanded stormwater management system. The most appropriate solutions should be demonstrated at a scale which will have a significant impact on the present problem. There should be grant money available for this initiative as it is a problem which exists across Canada.

The second study would involve an evaluation of options to upgrade the present effluent produced by the aerated lagoon system. Characterization studies followed by a pilot scale demonstration project processing a test stream of 100 m3/day of effluent from cell # 4 would be an acceptable scale for a feasibility study. An effluent polishing step followed by discharge to an engineered wetland capable of removing the nutrients and providing disinfection prior to discharge into the Integrated Water Management Strategy major water storage facility would be an ideal solution. Funding is available for the creation of the wetland or the project could be implemented through a separate phase of the Integrated Water Management Strategy major water storage facility implementation program.

Economic Development Strategy

David Amos & Associates was retained to procure grant assistance from the Province of Alberta's Rural Community Adaptation Program (RCAP) to offset the costs of the IDS study. The firm was also hired to produce the economic development strategy component of the IDS.

Personal interviews were conducted with key stakeholders in the region including government, economic development support agencies, business representatives, industry, post- secondary education facilities, tourism operators, and research centres. An online and hard copy resident opinion survey was also administered. In addition, separate facilitated sessions were held with the Town of Coaldale's Economic Development and Tourism Committee, and municipal councils and their senior staff.

In undertaking preparation of the strategy, it became apparent there is limited awareness of what economic development efforts presently occur within the region. However there is a clear appreciation of the need to become proactive and a desire to work with the opportunities which exist. Further there is a desire to cooperate with other individuals and organizations not limited to the geographic area of the study. Issues effecting industry and tourism involve neighbouring municipalities and cross-boundary cooperation will be necessary to succeed.

Both the County and the Town have many assets and despite facing some significant challenges, there are numerous opportunities for economic development success. In general the region is an attractive area for developments in agriculture, tourism, and small to medium sized industry. Successful development in these sectors will contribute to the future growth of other commercial service and residential developments. Offering excellent home purchase value, more residents will be attracted by stressing a friendly safe community atmosphere with local business opportunities and proximity to big city amenities.

While the introduction of the Canamex highway is unlikely to be either the saviour nor destroyer of the area, its future construction and alignment cannot be ignored. Steps to mitigate potential negative impacts need to be undertaken while anticipated positive spin-offs should be enacted upon.

As in any strategy, final implementation will be influenced by changing opportunities, challenge and organizational priorities that emerge. The key to success of the EDS is inter-municipal cooperation and the provision of adequate financial/staff resources.

There are four strategic priorities that will drive the economic development strategy accompanied by fourteen key results. The key results are specific outcomes the municipalities will accomplish to realize the priorities.

Strategic Priority #1: Establish a cost effective economic development program and governance structure that is responsive to the needs of both the County of Lethbridge and Town of Coaldale.

Key Results #1: An economic development delivery model is agreed to and enacted upon by the County and the Town

Key Results #2: Economic development is an inclusive activity that avoids duplication and maximizes the use of resources.

Key Results #3: Responsibility for "cradle to grave" site selection and investor enquiries is clearly defined and agreed to.

Strategic Priority #2: Establish activity and performance monitoring that effectively advances economic development in the County corridor and Town of Coaldale.

Key Result #4: An economic development activity work plan that can grow as success occurs and is within the financial means of the Town/County is adopted.

Key Result #5: Performance measures to monitor economic development progress is established garnering confidence and support for the program

Key Result #6: Qualified economic development professional(s) are hired to lead and execute the economic development strategy.

Key Result #7: A high profile consistently delivered Business Retention & Expansion Program is delivered within the area.

Strategic Priority #3: Maximizing Canamex economic development spin offs, and minimizing its possible negative impacts

Key Result #8: Utilizing the services of Oldman River Municipal Services, the desired land use and intensity of development is predetermined for the Canamex interchanges.

Key Result #9: An attractive regional based tourist information centre is located at the highway #3/Canamex interchange.

Key Result #10: Mitigating measures are undertaken by Coaldale in addressing the introduction of Canamex.

Strategic Priority #4: Through effective communication and place recognition, economic development will be advanced in the Town of Coaldale and the County of Lethbridge.

Key Result #11: The term "Greenway" is used to describe the IDS area and reinforce its guiding principles. Greenway is defined as a region with the goal of self-sufficiency, gained by successfully integrating innovative practices in the fields of planning, transportation, stormwater management and reuse, localized water treatment and water supply, economic development, and recreational opportunities. Residents are able to live, work, and play in urban pockets separated by linear corridors of open countryside. These linear corridors may be utilized for stormwater management areas and both low intensity agricultural uses such as pasture lands and cultivated fields, and recreational uses including natural areas, parks, and pathways.

Key Result #12: The Town and County become recognized as leaders in advocating and supporting partnerships.

Key Results #13: Economic development becomes a community wide, tri –level government supported initiative.

Key Results #14: The area becomes known as "Alberta's Gateway to International Trade and Commerce".

Regional Pathway System

A location for regional pathway system for bicycling and pedestrian connectivity between Lethbridge Urban Fringe and Coaldale has been identified. The respective land owners have been approached into the greatest extent indicated and openness to see the pathway accommodated. The use of the SMRID Drainage Swale is the primary location. Private landowners were also approached to confirm an ability to accommodate the regional pathway where a more direct connection was desired.

Open Space Planning

The County of Lethbridge and Town of Coaldale Integrated Development Strategy provides for an inter-municipal progressive stormwater management strategy that will assist in both the immediate and long term solution to flooding within the region. A secondary benefit to the stormwater management plan will be the incorporation of an open space planning component that provides for enhanced linear wetland development and the provision of an important pedestrian link between the communities of Lethbridge and Coaldale. The open space trail network will ultimately be a part of a larger proposed landscape enhancement program including re-grading and drainage improvements (south Coaldale lateral), erosion protection (rock/rip-rap), landscape improvements and linear wetland development (planting/native grasses), rest areas (site furnishings/fixtures), maintenance access improvements and hard surface pathway development.

Architectural Form and Character

A robust Prairie Architecture with heavy timber, low-pitched roofs and large overhangs is selected as an appropriate esthetic for the region in order to create an architectural identity.

History

The County of Lethbridge is located in the heart of Southern Alberta approximately 80 km (50 miles) from the US border. It occupies 2400 km² (1,100 mi.²) and is home to just under 11,000 residents.

Major centres include Barons, Nobleford, seven unincorporated hamlets, Coalhurst, Picture Butte and the largest community, the Town of Coaldale.

Blessed with numerous locational advantages including some of Alberta's best irrigated agricultural lands, ready access to a network of highways, close proximity to the US market, the presence of the CP main line rail service, a regional airport, nearby big-city amenities, and post-secondary educational facilities and government research facilities, growth in Coaldale and the County has been steady and consistent. However continued growth, and indeed the viability of the region, is now in jeopardy for the transitional reasons which follow below.

The Town of Coaldale lies in the center of a large drainage area known as the Malloy Basin. This Basin is in effect a sinkhole, or low point, that spreads over an area of 21,662 ha (53,505 acres) along the Highway #3 corridor within the County of Lethbridge. Despite efforts at draining storm run-off through a network of natural and constructed canals, with the majority of water discharging into the Stafford Reservoir, recurrent flooding during heavy rainfall and snow melt continues to be problematic.

Most recently, major flooding in the years 2002, 2005, and 2010 has occurred. Disaster recovery funding through the province's Emergency Management Agency totalled over $1 million for the 2005 flood alone.

The current storm water management issues affect both the County of Lethbridge and the Town of Coaldale, and pose a major roadblock to future development in the region.

The Town of Coaldale has invested over $13 million since 1984 in storm water infrastructure with goals of reducing flooding both within Coaldale and on downstream neighbouring lands.

Acting as a supply of water for cultural, recreational, municipal, and domestic water use, the irrigation system was not designed to convey storm water runoff resulting from severe storm events.

Compounding the situation are the presence of several major highways and the Canadian Pacific mainline which traverse the area thereby further affecting drainage flows.

The CANAMEX Corridor, which has the potential of reducing the effectiveness of flood protection already undertaken, is on the horizon and nearing inception.

Despite continuing remediation efforts, flooding continues to occur in the region resulting in property damage and lost productivity of agricultural lands. Additional pressure is placed on existing infrastructure to handle higher volumes of stormwater as development increases the amount of impervious cover on the land. The Town of Coaldale is working on drainage improvements and is making significant strides in managing historic runoff within the Town and that flowing into the Town.

Table of Contents

1.0 Introduction

1.1 Purpose

The County of Lethbridge and Town of Coaldale recognize that if done right and in a comprehensive fashion they can become recognized leaders in water management, a “best practice” for others to follow.

Rather than viewing water management requirements as a liability it can alternatively be transformed to become a catalyst that will attract investment, beautify the community, increase tourism, protect the environment, create recreational and other opportunities that collectively will be a major transitional stimulus for the region.

The County of Lethbridge and the Town of Coaldale are producing an Integrated Development Strategy (IDS) for the Lethbridge Coaldale corridor. Using professional expertise, an overarching vision for the land use will be created that will maximize servicing efficiencies, protect the environment, and pursue economic development opportunities to guide the sustainable growth of the region.

The IDS will address storm water, water, wastewater, transportation, economic and governance matters to create a blueprint that protects the existing quality of life for the region’s inhabitants and also protects the long term future of the region by helping to create a more diverse economic base.

1.2 Methodology

The Consultant Team for the Integrated Development Strategy (IDS) initiated the development of the study content through multiple meetings with the IDS Steering Committee which clarified the mandate and establish the methodology of information gathering and collaboration.

In order to ensure that all aspects of the Integrated Development Strategy were in concert with each other each of the respective consultants collaborated with the IDS Steering Committee and other team members on an ongoing basis. In addition regular meetings were held with the entire consultant team to collectively evaluate the findings and innovations proposed by each respective consultant.

An initial Community Consultation process was undertaken with interested and affected general public and civic leaders invited to provide direction and input. The public interaction process was directed by Place Makers with Geoff Dyer taking a lead role in the interaction. This initial information was analyzed by each respective member of the consultant team and became the structural basis around which the detailed information was developed.

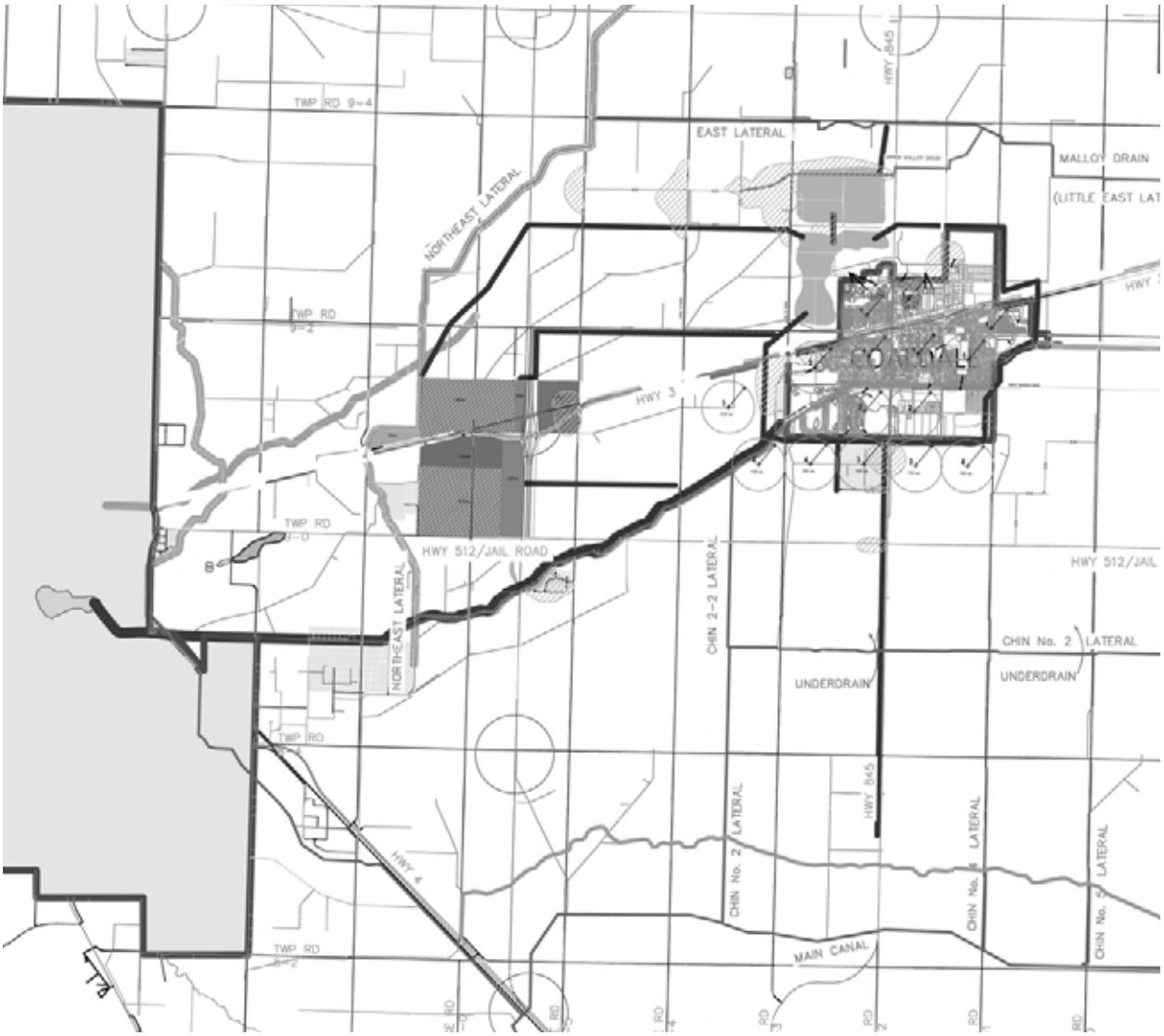
At the end of summer 2011 a draft copy of the findings was circulated for review by the IDS Steering Committee and administration with an understanding that additional community consultation would take place in the fall of 2011. Final adjustments based on this additional input were incorporated into the study such that it could be circulated to the RCAP Administration to meet the deadline for the end of 2011.

1.3 Scope of Report

The scope of the report covers the following disciplines in the defined study area:

Water supply and wastewater, storm water management, biophysical considerations, land-use, transportation, economic development strategy, a regional pathway system, open space planning, and architectural form and character. Each of these disciplines was studied in collaboration with all of the other study areas on an individual basis and also on a global basis in order to determine the impact that each discipline had on another and on the whole.

The study area encompasses the entire geographic region east of Lethbridge beginning at the urban fringe to a point just East of Coaldale. The southern edge of the region went as far south as the proposed new interchange for the Canamex corridor where it would interface with Highway 4 and North to the point at which the Canamex corridor takes a turn to the west north of Lethbridge. On occasion a respective discipline required the study area to be expanded in isolated areas in order to ensure comprehensive and exhaustive report. These anomalies are defined in each of the respective sections of the report.



2.0 Background

2.1 Background Studies

2.1.1 Malloy Drain Master Drainage Plan

The Malloy Basin is located in the County of Lethbridge around the Town of Coaldale and covers an area of approximately 21,662 hectares. The area is drained through a system of natural and constructed canals with the majority of the water discharging into Stafford Lake Reservoir through the Malloy Drain.

The area has historically experienced flooding during significant rainfall and snow melt events, most notably from the events experienced in 2002, 2005, and 2010. This has prompted the County of Lethbridge, Town of Coaldale and the St. Mary River Irrigation District jurisdictions to form a steering committee to investigate alternatives to help alleviate flooding and set design parameters for future development within the Basin. Implementation of the first phase of the plan has been completed. The three jurisdictions realize that the pressures of economic growth and land development will not subside, and guideline improvement strategies must be developed and put in place that deals with stormwater for any future developments.

2.1.2 County of Lethbridge/Town of Coaldale Inter-Municipal Development Plan

The purpose of the IMDP was to focus on land-use and related matters that require inter-municipal consultation, cooperation and commitment. It was developed in 2010 by the Oldman River Regional Services Commission in conjunction with the County of Lethbridge and the Town of Coaldale.

The specific objectives of the IMDP were to make a cooperative effort to plan efficiently and sustainably with both municipalities having flexibility to consider suitable development and land-use, to identify complementary growth areas and provide clear guidelines and resolution procedures in the event of conflict. All of this in recognition of the long-term agricultural nature of the lands within the plan area and the need to establish policies that address both concerns and opportunities.

The details of the IMDP were carefully studied in the context of the proposed planning solutions outlined in the IDS and greatly influence the outcome.

2.1.3 County of Lethbridge Municipal Development Plan

The MDP was developed in 2010 to guide policy regarding land-use and infrastructure investment decisions that respect the County's vision for the future and confirm its desire to remain predominantly agricultural while supporting diverse opportunities. It provides clear description of the counties direction relative to infrastructure, service provision, and future development and facilitates partnerships between adjacent municipalities and organizations demonstrating mutual benefit.

The MDP was reviewed to ensure that the policy guidelines relative to development were incorporated and that the mandates were adhered to in the IDS.

2.1.4 Town of Coaldale, Integrated Community Sustainability Plan

The ICSP was developed by the direction of AECOM in 2008 with a view to generating a Strategic Plan for the Town of Coaldale for the ensuing three years until 2010. The plan outlines cultural, social, economic, and environmental sustainability for the Town of Coaldale and includes a governance model. In each instance strategic initiatives are outlined to identify how goals and objectives, clarified through a public input process, can be achieved.

The "Natural Step" decision-making process was selected to be utilized as a framework for facilitating the development of the ICSP and as a tool for the analysis of the five Dimensions of Sustainability. In addition to addressing the three-year window each respective area also outlined sustainable actions to a 15 year threshold and beyond.

The ICSP was reviewed in detail in the context of the IDS and those respective components influenced by the ICSP are noted in the associated text.

2.1.5 Town of Coaldale, North Coaldale - Storm Water Management Plan

The Town of Coaldale developed the Storm Water Management Plan through retaining MPE Engineering Ltd. in 1999. The purpose of the plan was to address the surface drainage within the town of Coaldale limits North of Highway 3 and to analyze the surface drainage system which flows into the cheese factory drain, the Malloy drain, the East lateral and onto the Stafford reservoir.

The considerations and recommendations of the Storm Water Management Plan have influenced the Malloy Basin Drainage Studies over the years and were carefully considered in the context of the IDS.

2.1.6 The CANAMEX Corridor Trade Corridor

The CANAMEX Corridor links Canada, United States of America, and Mexico, the three NAFTA countries, and stretches 3,800 miles or 6,000 km from Anchorage Alaska to Mexico City, D.F., linking all of western North America.

The goals of the CANAMEX Trade Corridor are to:

- improve access for the north-south flow of goods, people and information;
- increase transport productivity and reduce transportation costs;
- promote a seamless and efficient intermodal transport system; and
- reduce administration and enforcement costs through harmonized regulations.

The CANAMEX Trade Corridor will facilitate the growth of trade and promote economic development in all the communities along the Corridor.

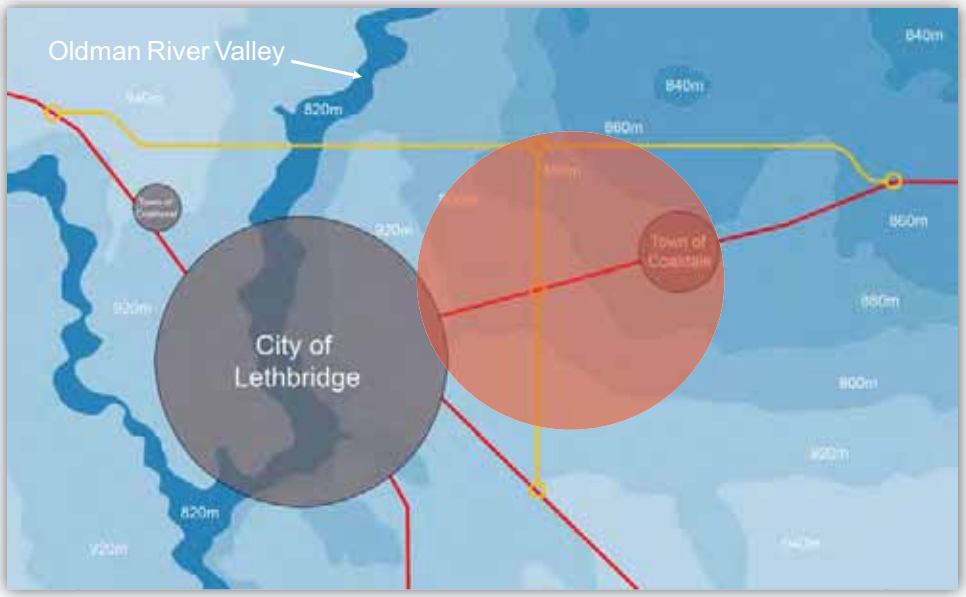


FIGURE 1 - Demonstrates the alignment of the CANAMEX Trade Corridor within the area of study.

The CANAMEX Trade Corridor will provide increased transportation access for businesses. This should generate economic growth within the region. Careful consideration of the traffic corridors can offer the opportunity for ser-

vice roads which will double the frontage of the highway corridor maximizing the growth potential and while some of the transportation roads may not be part of the immediate phase of development the master plan can contemplate the future growth in the region.

The increase of economically viable parcels in the corridor will also require infrastructure by way of telecommunications and other similar services to be considered for optimized growth. Another consideration will be the economic bypass of smaller towns, and given this consideration it is important to contemplate how this could be mitigated. The interchanges could be suitably located and the proper attractions be made available so that the smaller communities can still benefit from the new economic energy. The economic aspects of this study should consider this matter as well.

2.1.7 Birds of Prey Centre

In 1982 wildlife rescue activity in Western Canada was almost non-existent. Centre founders Wendy Slaytor and Colin Weir approached the Province of Alberta Fish & Wildlife Division with an offer to start Alberta's first volunteer wildlife rescue facility. With the help of MLA Bob Bogle and then Fish & Wildlife Minister Don Sparrow granting special ministerial permission to start their volunteer wildlife rescue work, they started rehabilitating what would grow to be thousands of injured birds from across Southern Alberta. They also began using injured and non-releasable birds for public environmental education programs in schools and provincial and national parks. In 1989 construction started on the Alberta Birds of Prey Centre at a new site that would be open to the public.

The Birds of Prey Centre uses a storm water pond to provide a recreational, educational and heritage attraction that preserves wildlife, promotes tourism and displays how a potential problem can be beneficial to the community.

3.0 Coordination Team

A team of consulting professional has been assembled to develop an Integrated Development Strategy between the County of Lethbridge and the Town of Coaldale. The IDS team will address storm water, water, wastewater, transportation, economic development within the region.

Integrated Development Strategy Consulting Team:

Alvin Reinhard Fritz Architect Inc.

David Amos & Associates

Browning Horrocks Design Inc.

D.A. Watt Consulting

Westhoff Engineering Resources Inc.

Canadian Clean Water Technologies Inc.

Placemakers

EBA Engineering Consulting Ltd.

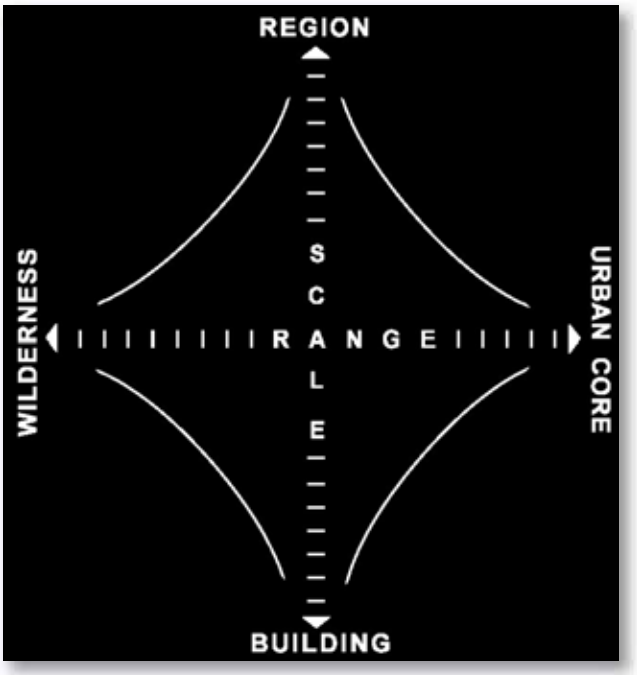
4.0 Land Use

4.1 Background

4.1.1 Land Use and the IDS

The economic development of the Lethbridge & Coaldale regional area has been constricted by the area's frequent flooding problems. The primary focus and motivation for the Integrated Development Strategy is first to solve the area's flooding issues, turning a storm water problem into a water management asset. The result of this will not only provide an opportunity to utilize and manage water to the advantage of local industry and residents, it also releases pent-up development pressures, particularly in anticipation of the future Canamex corridor. Currently there is no clear plan for how this growth should take place.

The Land Use component of the IDS seeks to provide an innovative, overarching plan for the Coaldale/Lethbridge corridor to maximize servicing efficiencies, protect the environment, pursue economic development opportunities, and guide the sustainable growth of the region. This is necessarily addressed on a number of scales: from the region to the individual building site; from short term to long term solutions; and, from the rural to the urban. As developed through an integrative process, the recommendations of this study are intended to advise subsequent reviews and amendments to the guiding policy and regulations for the Town of Coaldale and the County of Lethbridge, including their respective Municipal Development Plans and Land Use Bylaws.



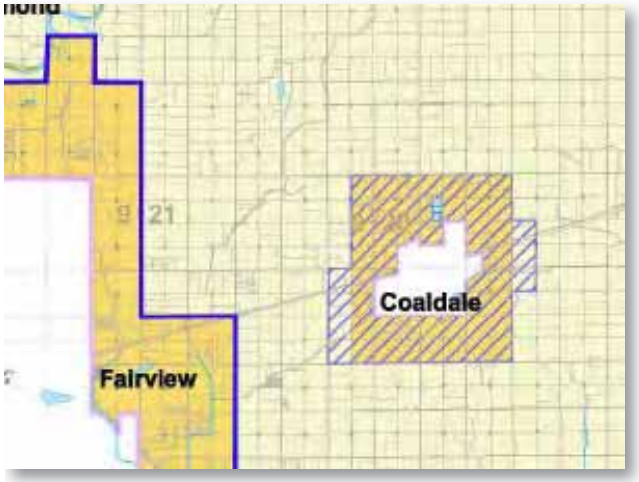
Land use considerations must be considered on many scales.

4.1.2 Positioning the Corridor

The Lethbridge County-Coaldale sub-region is regulated through a complexity of policy documents. The Lethbridge-Coaldale corridor in particular has long been identified as an important area for future commercial growth. Currently this six mile stretch of Highway 3, within the County, is caught between the interests of three municipalities, each with a competing stake in the future of the corridor. In consideration of a land use plan for the sub-region, it is important to strike a balance between the many competing interests. This will only be possible if each

municipality understands that they may not get everything they want, but if they work together with reasonable compromise they can be mutually supportive toward the broader goal of regional economic growth to the benefit of each municipality. As they relate to land use, specific issues that need to be addressed and coordinated include:

- **The Distribution of Land Uses:** Long a challenge between urban and rural municipalities, it will be important to clearly define the land uses and their distribution. It will also be important to understand timing of land uses as it relates to the future Canamex.
- **Contiguous Corridor Growth:** The question of whether commercial and urban growth should be contiguous along the entire length of Highway 3 raises many questions and effects many of the subregional issues. The alternative is to define growth at distinct nodes.
- **Mobility Along Highway 3:** While town residents value the high speed mobility between Coaldale and Lethbridge, future development will likely require traffic controls. Certainly contiguous growth along the corridor will maximize the need for traffic controls on Highway 3, reducing mobility.
- **The Canamex as a Bypass:** The Canamex will pose the well known challenge of new freeways bypassing municipalities. The valuable drive-by traffic once directed through city and town streets to their immediate commercial benefit, may now bypass on the new freeway system. Positioning the Highway 3/Canamex interchange will be important as it relates to gateways and the direction of traffic into the Town and City. Once again, will Coaldale be viewed as a town in the distance, or will it be lost amongst contiguous corridor development?
- **The Future Old Highway 3:** As the Canamex is developed, Highway 3 will be available for reconsideration. Still a conduit for vehicular mobility, it could also be considered for bikeways, trails, and a more hospitable relationship with the Town.
- **Repositioning Broxburn:** Broxburn is currently an underdeveloped business park with fully developed infrastructure in place. As the corridor is opened up to development, this immediate opportunity could be repositioned as an important centre for future corridor development.
- **Low Density Residential:** While it has generally fallen out of favour due to its land consumption and high reliance on the automobile, there will likely be future demand for country residential in the County. This growth should be limited, and directed toward more sustainable development patterns.
- **The Rail Corridor:** The Canadian Pacific rail corridor on the north side of Highway 3 poses both a barrier challenge to vehicular mobility, but also an opportunity for abutting parcels on the north that can take advantage of rail transport.
- **Town Growth:** Current town growth patterns follow the conventional vehicular focused, separated use development patterns of the last century. Future growth should consider current best practices in Smart Growth and a sound rationale for directing new growth.



Interest in the six mile stretch of the Highway 3 corridor between Coaldale and Lethbridge is shared among three municipalities.

4.1.3 Policy Guidance: Smart Growth & Sustainability

Fortunately, current broad policy in the County and the Town provide guidance toward more progressive best practices for future development patterns. These focus particularly on the ideas of Smart Growth and triple-bottom line Sustainability.

The County of Lethbridge 2009 Integrated Community Sustainability Plan (ICSP) establishes direction to "Encourage Smart-growth and cluster development practices for new developments" in new residential development. While specific strategies and principles have been relegated to subsequent policy documents, both the ICSP and the 2010 County MDP emphasize triple bottom line sustainability.

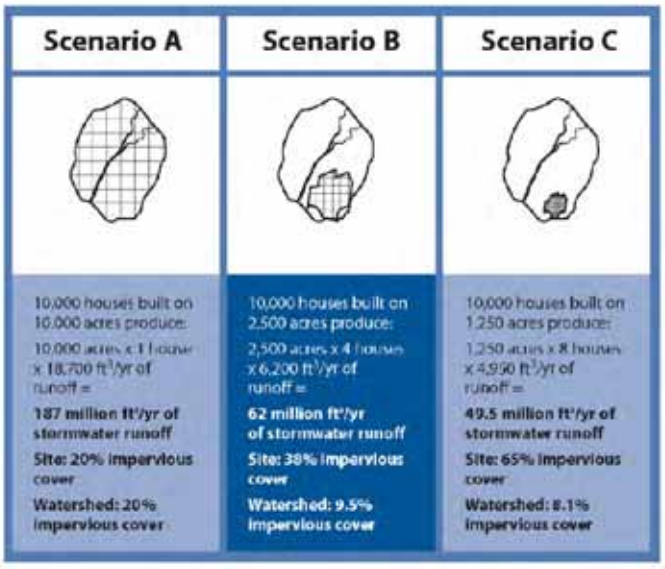
A similar situation is presented in Coaldale policy. The 2009 Coaldale Integrated Sustainability Plan establishes the direction to "Promote urban densification (grow up not out) and mixed use developments, Plan for mixed use development on main street, and attract developers who will develop high quality mixed use developments." Once again, detailed strategies are relegated to subsequent policy. And while the outdated 2000 Coaldale MDP and Land Use Bylaw do not adequately implement this vision, there is an opportunity to update both of these documents to do so.

4.1.4 The Link Between Sustainability, Smart Growth, & Storm Water Management

Once again, while the originating drive of the IDS is to address the region's flooding issues, the opportunity of the IDS is to achieve innovation toward realizing the sustainability and Smart Growth aspirations of the Town and County- and ultimately the long term economic health of the region. The proposed water system is comprehensively based on triple bottom line sustainability, integrating human and natural water systems in innovative ways.

But sustainability is not about disconnected individual issues, it is about a bigger picture of integrated issues. The value of implementing a progressive water management system is diminished if the broader sustainability mandate does not address the need to build walkable communities, balanced regions, promote local agriculture and production, and reducing reliance on fossil fuels. More importantly, storm water is directly tied to development patterns.

A recent study from the US Environmental Protection Agency explored this important relationship. An important finding is that while there is a tendency to address sustainable storm water management on a site-by-site basis, this approach is antithetical to the broader environmental need to build more compact, pedestrian friendly neighbourhoods. To reframe the question, current best practices suggest that Storm Water must be considered on a per-capita basis supporting increased density, rather than a site-by site basis that favours lower density development. The graphic shown below demonstrates this principle, supporting the need for building more compact, walkable communities. It is this integrated view of sustainability that is at the core of the IDS land use approach.



A study from the U.S. EPA describes the importance of increasing density to reduce storm water runoff.

4.1.5 The Charrette Process

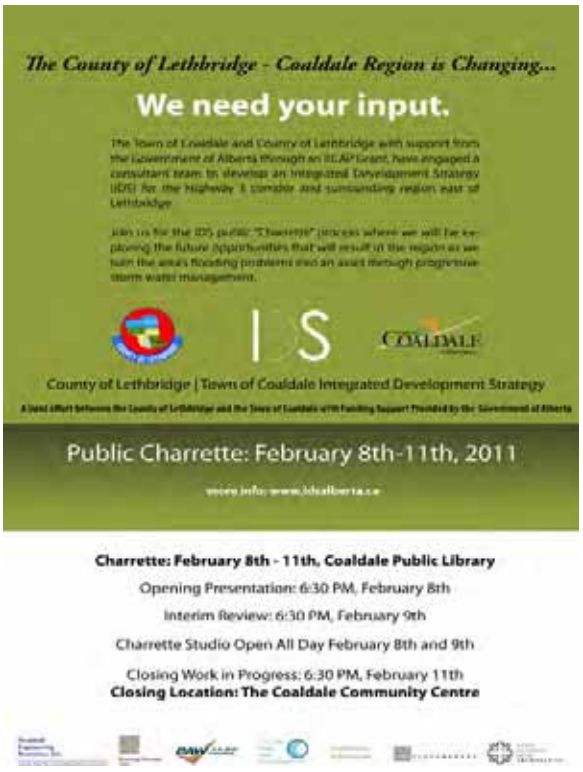
Because of the many competing interests within the Lethbridge-Coaldale subregion, the Land Use component of the IDS was developed through a unique Charrette design process. The Charrette is a multi-day on-site design process where stakeholders are plugged into a public design process. Rather than consultants developing plans in isolation, to be presented back to stakeholders in a reactionary process, the Charrette allows for the design process to be conducted in a transparent public venue.

The IDS charrette was conducted at the Coaldale Public Library as a four day process from February 8-11, 2011. The four days were organized as follows:

- Day 1: Informal stakeholder meetings, IDS team design concepts, and an evening opening presentation to present the project background and approach to stakeholders and interested public.
- Day 2: Targeted topic meetings for key stakeholders and interested public. Developing Concepts were formally presented in an evening open house. Comments from this session were fed into subsequent design concepts.
- Day 3: Design team concept refinement and production, continued stakeholder meetings, and an evening team pin-up to verify direction moving forward.
- Day 4: Design team production and preparation for evening presentation. An evening presentation on the Charrette outcome and land use design concept was conducted at the Coaldale Community Center.

The Charrette was advertised to the public through posters at local businesses and public buildings, and ads printed in two consecutive weeks of the Sunny South News which were delivered to all area residents. All affected land owners within the Corridor were individually contacted.

With a fairly narrowly defined, yet regionally scaled project such as the IDS, it can be difficult to attract the general public who's concerns are focused mainly on immediate impacts to their land. Additionally, the public in both the County and Coaldale had undergone significant recent public engagement with their Integrated Sustainability Plans and other policies which in turn formed the basis for the IDS charrette. While public attendance started slow, the final presentation was well attended by key stakeholders and some members of the public. Most importantly, the Charrette provided a venue for key land owners, elected officials, municipal officials, and other stakeholders to work together toward the land use concept in a publicly accessible and transparent process.



The charrette process was advertised through a variety of methods, and the open schedule allowed flexible attendance times.

4.1.6 Smart Growth as a Starting Point

The Land Use team for the IDS was selected specifically for their core competency in implementing Smart Growth and sustainable development practices. The IDS provides an opportunity to make more specific recommendations for achieving broad policy goals and visions. Because Smart Growth itself is a broad set of principles, guiding principals and design concepts will move beyond broad principles toward specific implementation.

As a starting point, Smart Growth is founded on the following core principles:

1. Mix land uses.
2. Build well-designed compact neighbourhoods.
3. Provide a variety of transportation choices.
4. Create diverse housing opportunities.
5. Encourage growth in existing communities.
6. Preserve open spaces, natural beauty, and environmentally sensitive areas.
7. Protect and enhance agricultural lands.
8. Utilize smarter, and cheaper infrastructure and green buildings.
9. Foster a unique neighbourhood identity.
10. Nurture engaged citizens.

4.1.7 Guiding Policies: Walkable Communities, Balanced Regions

With the adopted broad policy of the Town of Coaldale and Lethbridge supporting the general goals of Smart Growth and triple bottom line sustainability, the following principles form the guiding policies for the IDS Land Use concepts. Each should be considered for incorporation as policies within the broad policy of each municipality.

4.1.7.1 The Region

- The region should retain its natural infrastructure and visual character derived from topography, woodlands, farmlands, riparian corridors and lakeshores.
- Growth strategies should encourage infill and redevelopment in parity with new development.
- Development contiguous to urban areas should be structured as Sustainable Neighbourhood Units and be integrated with the existing urban pattern.
- Development in non-contiguous to urban areas should also be organized in the pattern of Sustainable Neighbourhood Units.
- Affordable Housing should be distributed throughout the region to match job opportunities and to avoid concentrations of poverty.
- Transportation Corridors should be planned and reserved in coordination with land use.
- Green Corridors should be used to define and connect the urbanized areas.
- The region should include a framework of transit, pedestrian, and bicycle systems that provide alternatives to the automobile.

4.1.7.2 The Community

- New and infill Sustainable Neighbourhood Units should be complete, compact, and walkable, and should encourage green building standards and high performance infrastructure.
- New and infill Sustainable Neighbourhood Units should be the preferred pattern of development and Districts specializing in a single use should be the exception.

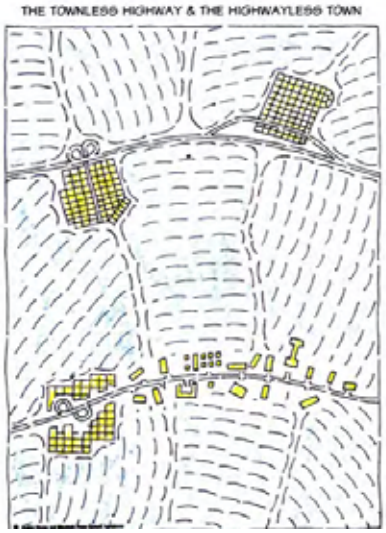
- Ordinary activities of daily living should occur within walking distance of most dwellings, allowing independence to those who do not drive.
- Interconnected networks of thoroughfares should be designed to disperse and reduce the length of automobile trips.
- Within neighbourhoods, a range of housing types and price levels should be provided to accommodate diverse ages and incomes.
- Appropriate building densities and land uses should be provided within walking distance of transit stops.
- Civic, institutional, and commercial activity should be embedded in town centres, not isolated in remote single-use complexes.
- Schools should be sized and located to enable children to walk or bicycle to them.
- A range of Open Space including Parks, Squares, and playgrounds should be distributed within neighbourhoods and town centres.

4.1.7.3 The Block and the Building

- Buildings and landscaping should contribute to the physical definition of thoroughfares as civic places.
- Development should adequately accommodate automobiles while respecting the pedestrian and the spatial form of public areas.
- The design of streets and buildings should reinforce safe environments, but not at the expense of accessibility.
- Architecture and landscape design should grow from local climate, topography, history, and building practice.
- Buildings should provide their inhabitants with a clear sense of geography and climate through energy efficient methods.
- Civic Buildings and public gathering places should be provided as locations that reinforce community identity and support self-government.
- Civic Buildings should be distinctive and appropriate to a role more important than the other buildings that constitute the fabric of the city.
- The preservation and renewal of historic buildings should be facilitated, to affirm the continuity and evolution of society.
- The harmonious and orderly evolution of urban areas should be secured through form-based land use regulations that enable mixed-use and walkability.

4.2 Sub-Regional Plan

4.2.1 Overview



The outer boundaries of the IDS planning area can be generally defined as a sub-region encompassing the Highway 3 corridor east of Lethbridge and all the affected areas including and surrounding the Town of Coaldale. In terms of water management, the sub-regional planning area focuses on all frequently flooded lands and the broader watershed. In terms of land use, the IDS defines a sub-regional planning area aiming to "provide an overarching vision for the land use within the Coaldale/Lethbridge Corridor." as defined by the RCAP application.

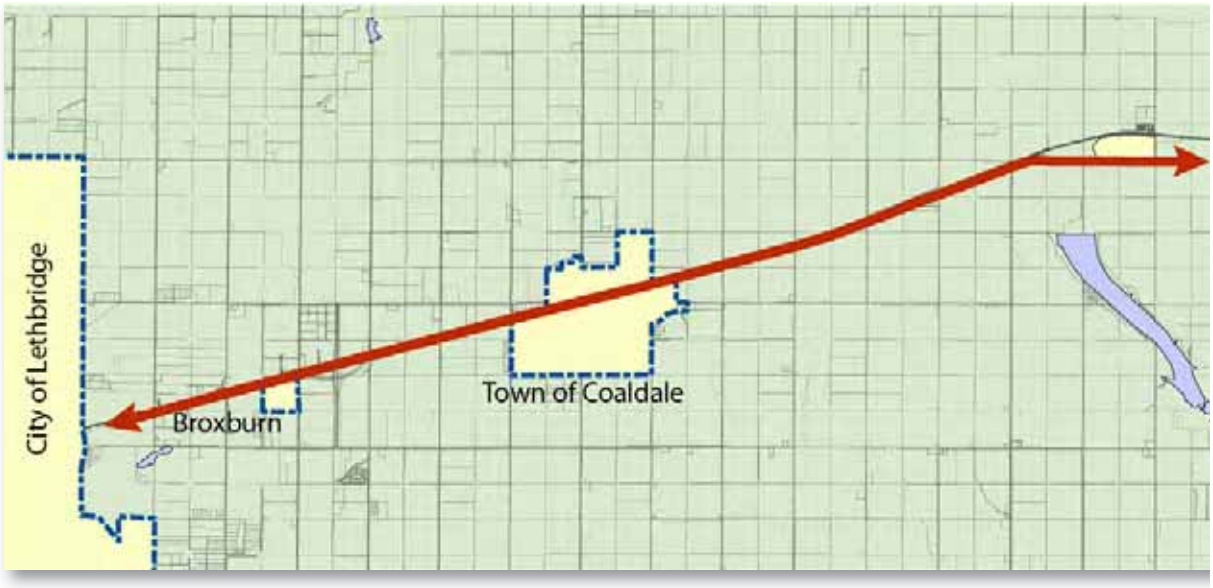
Left alone to market pressures, the subregional area would experience widespread growth that would soon see the contiguous growth of disconnected commercial and industrials sites along the entire Highway 3 Corridor from Lethbridge to Coaldale. The Sub-Regional plan provides a rationale for a more predictable, yet flexible outcome that can balance the desires of various regional stakeholders. Key to the proposed concept is the concentration of growth into key development clusters set within a clear regional structure of corridors and preserved agricultural countryside.

Subregional planning will guide how the corridor will grow into the future: Will it be contiguous, scattered development or will it be clustered? (Graphic by DPZ & Co.)

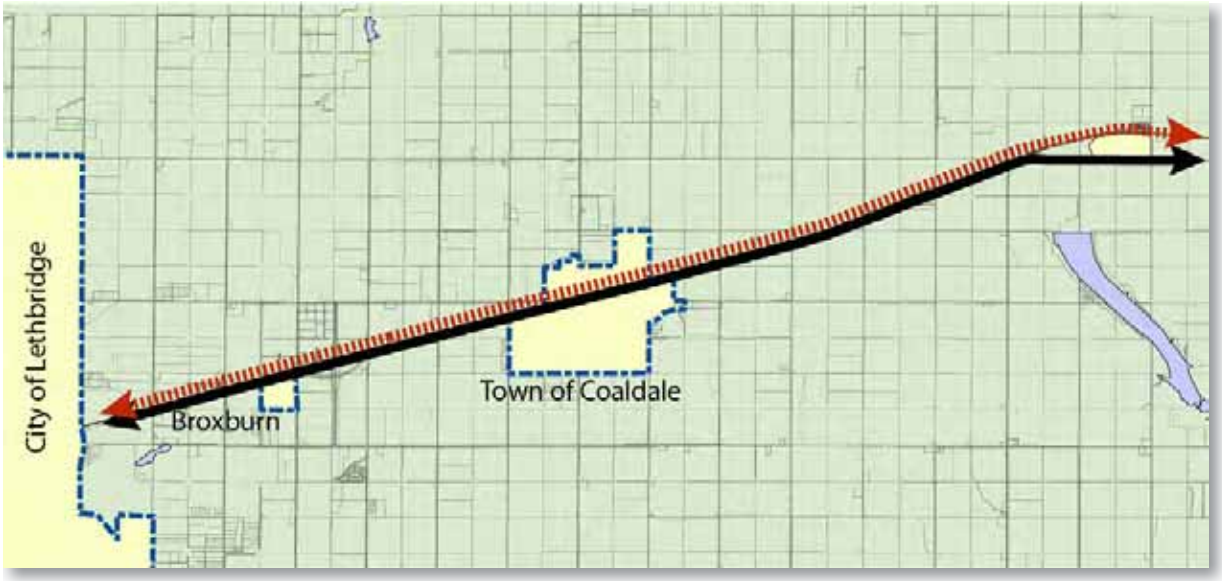
4.2.2 Sub-regional Structure: Corridors

The Subregional plan is built on a clear regional structure of corridors that provide a rational for locating development clusters & countryside. This also allows for a clear link between transportation and land use. The nature of many of these corridors are addressed in other sections of the IDS.

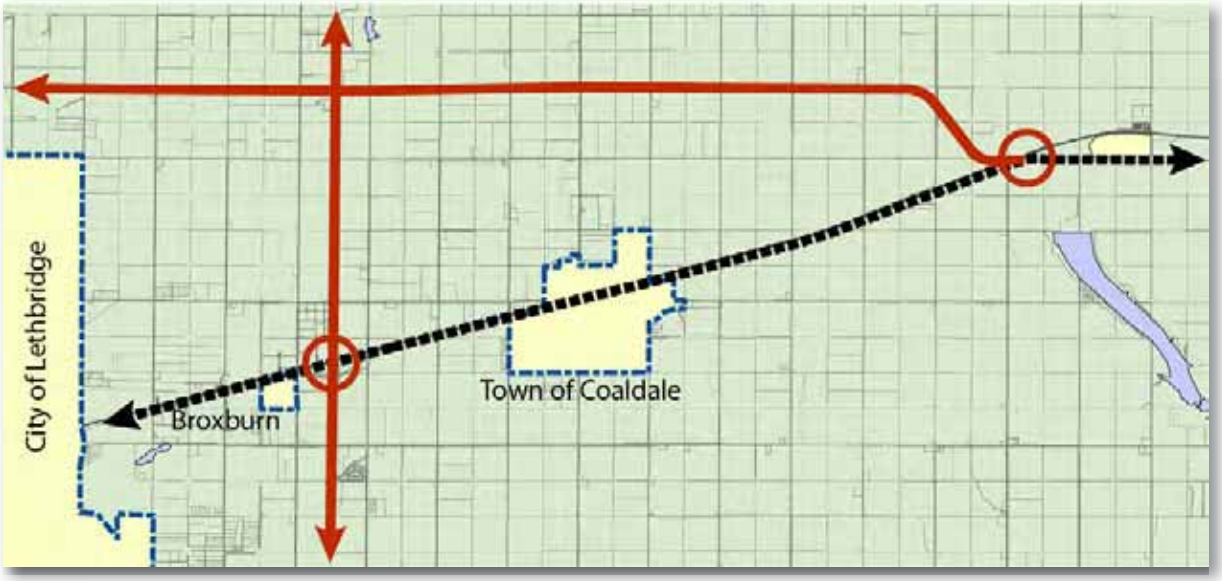
1. **Highway 3:** The primary structuring element of the sub-region is, and will continue to be Highway 3 itself. As a provincial road, there is little flexibility in its current design and interface. As the Canamex is completed, Highway 3 will be available for municipal control allowing for more flexibility in its use and interface.



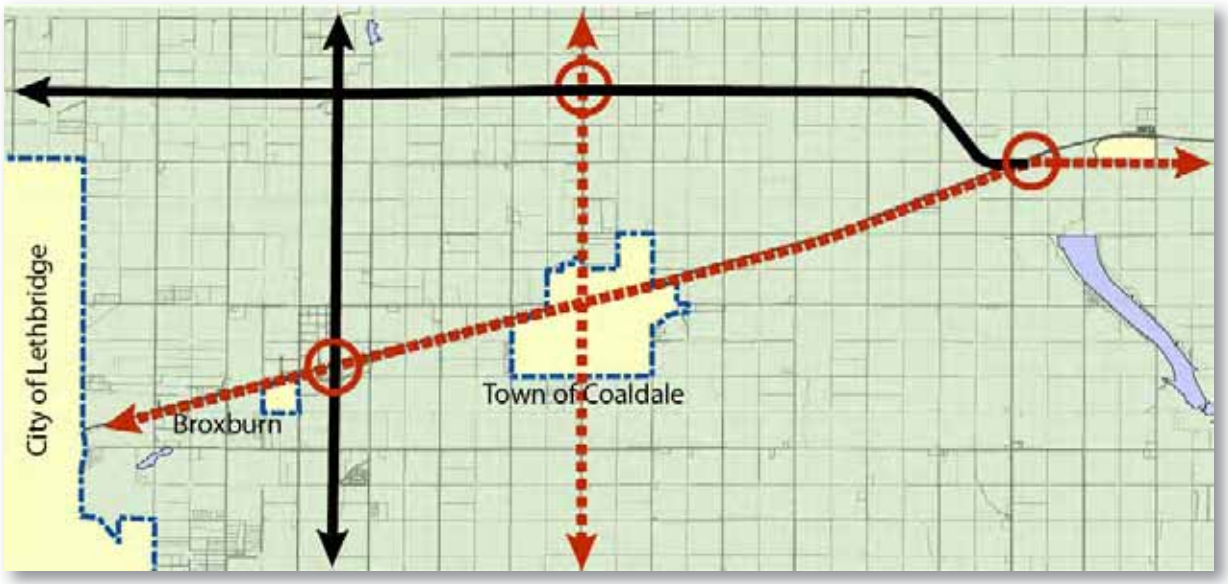
2. **Canadian Pacific Railway Corridor:** Built on the north side of Highway 3, the existing Canadian Pacific Railway Corridor creates both a vehicular constraint to the north, and an opportunity for abutting industrial uses as rail transport becomes increasingly demanded.



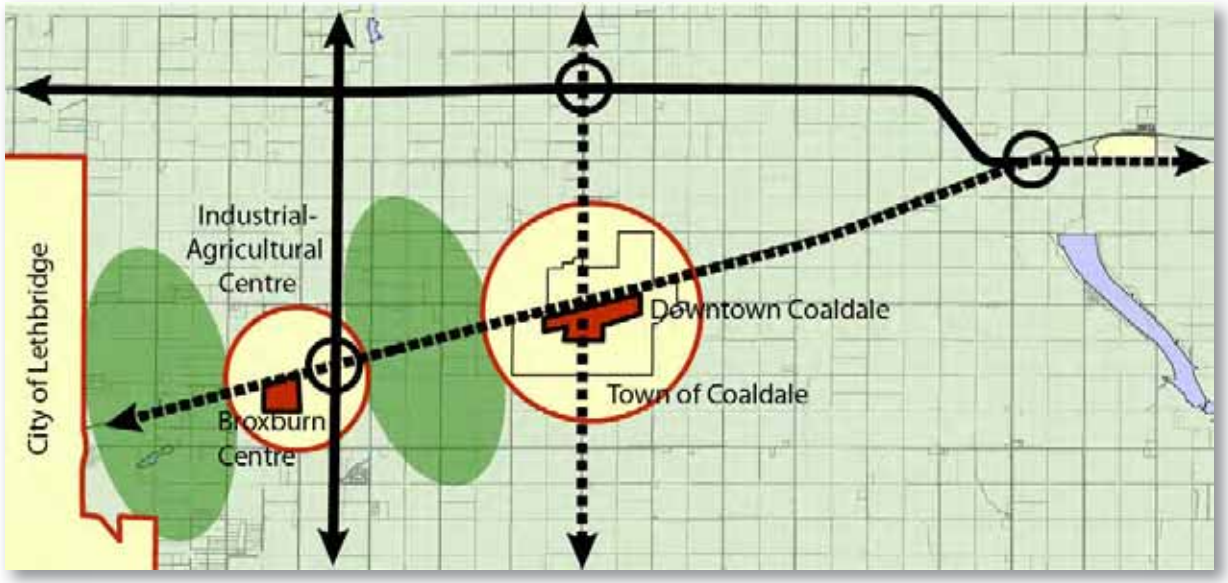
3. **Canamex & Highway 3:** As the Canamex is built, it will create a significant crossroads at the intersection of Highway 3. While the result of this will allow municipal control of Highway 3 , it also defines a traffic bypass around both Coaldale and Lethbridge.



4. **The Coaldale Crossroads:** As a result of the Canamex bypass, and Highway 3 realignment, the intersection of old Highway 3 and Highway 845 (20th Street) will become an increasingly important crossroads within the Town. Both of these roads link into key interchanges to the new highways at either end. Future town expansion, streetscape improvements, and redevelopment should respond to these corridors axis as "front doors" to the town.



5. **Regional Pathway:** The proposed regional pathway will create an important link between the Town of Coaldale and the City of Lethbridge. Future development should provide appropriate, frequent linkages and pedestrian interfaces to this pathway system.



This graphic illustrates a basic concept for sub-regional integration of the water management system with the land use concept. This graphic is illustrative only. The Water Management section of the IDS provides a more refined concept.

6. **Water Management:** The proposed water management strategy will provide a number of opportunities for future development including passive recreational areas, green space, access to water, and water runoff management. The phasing and location of future growth should respond and integrate with this water system.

4.2.3 Subregional Structure: Development Clusters & Countryside

As a widespread human pattern, towns and cities exhibit an innate wisdom of "clustering" development for collective benefit of social interaction, commerce, efficient infrastructure, identity, and economic development. The same wisdom holds true for industrial and commercial development along the highway 3 corridor. Collected together as an identified cluster at the future Canamex interchange, these collective benefits can be realized here as well. Built on the framework of regional corridors, three distinct development clusters are identified along the corridor.

The balanced region vs. sprawl. (Graphic by DPZ & Co.)

Two of the identified clusters include the contiguous urbanism of Lethbridge to the west, and the Town of Coaldale to the east. The third is a proposed County Agricultural-Industrial cluster at the future Canamex interchange with the Broxburn business park at its centre. As the central cluster, the proposed Agricultural-Industrial Centre is positioned as a freestanding entity separated from both the Town and the City by a preserved agricultural greenbelt.

This arrangement addresses a number of land use challenges for the IDS:

- Like an incorporated municipality, it provides a tangible entity that can be collectively marketed for economic development, shared infrastructure, and synergies between compatible industry clusters.
- It centralizes industrial development to limit the number of traffic control lights along the Corridor- a balance necessary between the mobility needs of the town and the development needs of the County.
- It allows for Coaldale to retain the visual impression of a distinct town in the distance rather than blending into the background of contiguous industrial growth.
- It positions the Broxburn Business park as a logical central first phase while allowing flexible future expansion in the context of the Canamex.
- It provides an identifiable centre that can serve as a transit hub, a central meeting place, and a visitor interface.
- It provides a visual, aesthetic, and functional link to the agricultural countryside that is the backbone of the local economy.
- It can address the future Canamex by capitalizing on drive-through traffic, provide a gateway to Lethbridge and the Town of Coaldale, and provide services to Canamex users.

4.2.4 Policies and Recommendations

To implement the sub-regional plan, the following policies should be considered:

4.2.4.1 Corridors

- Up until the development of the Canamex, new development should respect the planned intersection alignment and planned controlled intersections.
- Although contiguous corridor development would require traffic lights at regular intervals, the proposed Agricultural/Industrial cluster should be designed to require no more traffic lights than necessarily, ideally aiming at no more than two additional lights.
- As Highway 3 enters into the Town of Coaldale, particularly at the proposed western expansion, a more pedestrian friendly interface should be established through the use of a multi-way boulevard.
- Following the Canamex completion, Highway 3 should be reconsidered for incorporation of bicycles, pedestrian paths, and transit.
- The constraints posed by the CP Railway should be considered as part of Town expansion and future commercial/industrial development in the County.
- New and existing industrial areas directly abutting the railway should be designed to allow for future rail spurs to the north through a rail spur right of way. Industrial parcels closer to the railway should not prevent parcels to the north from utilizing a planned spur line.
- In anticipation of the impacts of the future Canamex and realignment of Highway 3, the crossroads formed by old Highway 3 and Highway 845 (20th Street) within the Town of Coaldale will be increasingly important and should be emphasized as a “front door” to the community, addressed in both character and function.
- The crossroads formed by old Highway 3 and Highway 845 (20th Street) within the Town of Coaldale should be recognized as a spine to direct future growth.
- Future development should provide appropriate, frequent linkages and pedestrian interfaces to the proposed regional pathway system.
- The phasing and location of future growth should respond and integrate with the proposed water management system.

4.2.4.2 Development Clusters and Countryside

- Identified as distinct clusters of development, future development on the eastern and western edges of the Lethbridge-Coaldale corridor should be contiguous to existing Town and City development.
- An Agricultural-Industrial Centre should consolidate all future development along the corridor at a central cluster at the future Canamex Interchange.
- The Broxburn Business Park should be established as an identifiable centre for the cluster.
- A preserved agricultural greenbelt should be established between the Agricultural-Industrial Centre and both the Town of Coaldale and Lethbridge.

4.3 County Agricultural-Industrial Centre Plan

4.3.1 Overview

Centred on the Broxburn Business Park, a freestanding central cluster of Agricultural-Industrial land uses along the Highway 3 corridor and future Canamex interchange provides a key structuring element for future land use in the sub-region. Ideally located midway along the Highway 3 corridor at the convergence of the Canamex and Canadian Pacific Railway, this cluster promises to become an important intermodal hub for agricultural business and industrial operations at the very heart of the rich agricultural region east of Lethbridge.

As an identifiable cluster, the area can be marketed and developed to the benefit of the greater region. This cluster would include Broxburn serving as a business centre to the complementary rural industrial uses to the north and south. A Highway Service area to the northeast of the planned interchange would provide a variety of highway commercial and other uses to the traveling public.

4.3.2 Broxburn as Centre

With infrastructure in place, the underdeveloped Broxburn Business Park provides the ideal hub, an identifiable centre, and the logical first phase for the larger Agricultural-Industrial Centre. The centre should be a pedestrian friendly place that allows for the most intense concentration of commercial activities, employees, and other complementary land uses. To achieve this, a new “Rural Industrial Centre” land use category tied to a clear master plan would:

- Require buildings to be built to the sidewalk with main entries facing onto wide pedestrian friendly sidewalks and streets reconfigured to allow for on-street visitor parking.
- Re-conceptualize the water management parcel on the northeast as a useable public space forming a central public space for the overall cluster.
- Allow for limited restaurant and local commercial uses at corners and around the central public space at the centre’s main entry to serve daytime guests and employees.
- Expand to the east to straddle both sides of Range Road 210 and integrate directly with the water management areas to the east.
- Define Range Road 210 as in important “front door” and gateway to the Agricultural-Industrial Centre.
- Provide a public building designed with an identifiable vertical element and located along the central public space serving as a visitors centre and landowners association.
- Establish innovative on-site water management standards for the site and building.

4.3.3 Rural Industrial Land Use

As illustrated by the existing land use map in **Figure 4.1**, the corridor might appear as a blank canvas defined only by agricultural countryside. However, the green coloured Rural Agriculture (RA) designation actually allows a range of agricultural intensities from cultivated and pasture lands, to isolated heavy agricultural industrial uses that are

indistinguishable from heavy industrial. Already, the corridor is experiencing scattered industrial development that detracts from the many benefits of a clustered industrial centre.

Addressing the open nature of the RA land use designation is central to the Agricultural-Industrial Centre Plan concept. In order to effectively implement the freestanding cluster set apart by agricultural greenbelts, it will be necessary to more narrowly define the land use district to separate low intensity agricultural lands from isolated industrial uses.

To achieve this, it is proposed that the RA land use designation more narrowly define low intensity agriculture lands such as cultivated lands, pasture lands, and natural areas. With this in place, an agricultural greenbelt would be clearly established by the RA land use district. Throughout the County, existing isolated industrial and many extensive agricultural uses should be redesignated with a proposed new land use district, Rural Industrial.

The proposed "Rural Industrial" land use designation would provide a mechanism for the County to control and limit isolated industrial uses. The designation would also allow for the development of use-specific site design standards including storm water management standards. While the designation would be similar to Rural Grouped Industrial, it would additionally allow for extensive agriculture to take place. It is proposed that the new Rural Industrial land use also be utilized for the proposed rural industrial clusters to the north and south of Broxburn to allow for a mixture of extensive agriculture and industrial uses- both of which could benefit from locating within the cluster.

4.3.4 Rural Industrial Districts

With Broxburn as a centre, two Rural Industrial districts are proposed immediately to the north and south. These areas would allow for development similar to grouped industrial development, but would also allow for coinciding extensive agricultural uses. Each cluster has a unique market appeal, and redesignation would require careful timing tied to both the Canamex, and the healthy build-out of Broxburn.

Because of the proximity to the CP Railway, the cluster to the north should protect a potential rail spur right of way. In addition to serving Canamex truck traffic, the train may provide an important intermodal link. The cluster to the South should be reserved for truck oriented services and those uses that would benefit from close proximity to the Broxburn Centre.

4.3.5 Highway Service Area

A Highway Service Area is proposed on the northwest quadrant relative to the future Canamex corridor. A departure from the industrial focus of the main cluster, the Highway Service area would be focused mainly on services for the traveling public. A predictable, yet flexible master plan distributing land uses and phasing with the onset of the Canamex will be important.

Although focused primarily on highway commercial, other uses should be considered including a welcome centre and short term overnight camping for tents and recreational vehicles. Much of the area is already designated as Grouped Rural Industrial and should be allowed to retain this entitlement. With the addition of overnight camping uses, the Coaldale Lethbridge Corridor (CLC) land use designation is appropriate. However a cohesive master plan for the area will allow appropriate phasing and design.

It is proposed that the area be designed for walkability and to incorporate the proposed architectural design guidelines. It is recommended that the master plan limit and define the uses to include no more than one 100-200 room convenience hotel, two restaurants, one gas station, and a water management pond with passive recreational facilities (picnic tables and benches)- all connected by sidewalks.

4.3.6 Water System Integration

One of the great innovations of the IDS will be the comprehensive, integrated water management system. The Agricultural-Industrial Centre provides an opportunity to showcase this system. Site development standards should define water usage standards, rain water collection and use standards, and integration into the sub-region's proposed water management system.

A water management pond complex is proposed on the eastern edge of the industrial cluster as it runs up against the future Canamex. This complex is intended to serve as consolidated water management for the cluster, allow for

passive recreational green space and pathways, and contribute to the subregional channeling, storage, and treatment of rainwater. Specific pond requirements are discussed in more detail as part of the IDS water management proposal and are shown here only as an illustration.

4.3.7 Policies and Recommendations

4.3.7.1 Broxburn:

- The existing Broxburn Business Park should be identified as the centre for a future Agricultural-Industrial cluster. For marketing and identity purposes, the entire area should be considered as "Broxburn Agricultural-Industrial Centre"
- As a centre, Broxburn should be established as a focal point for higher employee concentration, allow for a transit hub, be designed as a pedestrian friendly urban environment, provide bicycle facilities, and be equipped with an identifiable central public space.
- A new "Grouped Industrial Centre" (GIC) land use designation should be established to implement Broxburn as a centre, expanding on the Grouped Rural Industrial Designation.
- The GIC designation should enforce urban design standards including the reconfiguration of streets to allow for on-street parking counting toward the guest parking requirements of the abutting use and the requirement for buildings to be street oriented with minimal setbacks and their main entry facing pedestrian friendly sidewalks.
- The GIC should allow for limited local commercial on corners and around the central public space.
- A master plan should be established to further guide the development and allow for effective marketing of the Broxburn Centre.
- Broxburn Centre should have a highly visible connection into the regional pathway system.

4.3.7.2 Industrial Land Use

- The Rural Agricultural land use should be narrowly defined to low intensity agricultural uses such as cultivated lands, pasture lands, and open natural space.
- A Rural Industrial (RI) land use should be established to control isolated industrial activities and allow an appropriate land use to direct extensive agriculture and rural industrial into the Agricultural-Industrial centre.
- The RI designation should allow for extensive agriculture in addition to those uses established in Grouped Rural Industrial.
- All isolated industrial uses should be redesignated to RI.
- The designation to RI for new developments should be restricted through the MDP, and directed to the Agricultural-Industrial Centre whenever possible.
- All industrial lands shown in **Figure 4.2** should be available for redesignation to either Rural Grouped Industrial or Rural Industrial. Parcels currently in use as isolated industrial or other complementary uses should be immediately redesignated to Rural Industrial.
- Except for those parcels already operating as isolated industrial uses, or those parcels wishing to operate extensive agricultural uses, the redesignation of lands to the south of Broxburn should be restricted until such time as the Canamex is constructed.
- Except for those parcels already operating as isolated industrial uses, or those parcels wishing to link to a rail spur, the redesignation of lands to the north of Broxburn should be restricted until such time as the Canamex is constructed, or a suitable site within Broxburn is not available.
- The proposed industrial lands to the north of Broxburn should reserve at least one suitable right-of-way for a rail spur per quarter section.
- All industrial land use designations should be associated with site and building design standards that address aesthetics, pedestrian access, and water management in conjunction with the proposed IDS water management strategy.

- All roads within industrial lands should connect to other roads, forming a network.
- All roads within industrial lands should be equipped with on-street parking and sidewalks, with offices and showrooms oriented to the street.
- The street network should provide clear links to the existing east-west roadway network that exist collateral to Highway 3. Additional east-west roadways should be connected through industrial developments to allow multiple internal routes to destinations without requiring access to Highway 3.

4.3.7.3 Highway Service Area

- The lands identified on **Figure 4.3** as Highway Service should be redesignated to Coaldale-Lethbridge Corridor
- A master plan should be established for the entire Highway Service area reflecting timing and design constraints associated with the Canamex, pedestrian access, incorporation of the water system, and the limiting and balancing of land uses.
- Land uses within the Highway Service area should allow some flexibility but limit highway commercial uses as follows: one 100-200 room hotel, one gas station, and two restaurants.
- The Coaldale-Lethbridge Corridor should add a provisional land use allowing short term overnight tent and recreational vehicle camping
- The Highway Service area should be provided with an interlinked system of sidewalks that provide internal pedestrian links to all uses and external links to any sub-regional pathways and the Broxburn Centre.
- Timing of the Highway Service Area and redesignation to Coaldale Lethbridge Corridor should be linked to the development of the Canamex. Until such time, existing Rural Grouped Industrial land uses can be developed provided they respond to the future Canamex alignment.

4.3.7.4 Water Integration

- Water management ponds should be designed as active public spaces with trails, sitting areas, and picnic areas.
- All land use designations should incorporate progressive water management standards in response to the IDS water management strategy.

4.4 Town Plan

4.4.1 Overview

There are many factors that will impact where Coaldale will grow in the future. But the questions of "what" and "how much" may prove to be the more challenging questions for future development. Fortunately, current broad policy from Coaldale's Integrated Sustainability Plan provides guidance towards Smart Growth, mixed use development, and triple bottom line sustainability. The Town Plan provided as part of the IDS process is intended to build from this policy, providing specific recommendations for updating the outdated 2000 Coaldale MDP and expanding the Coaldale Land Use Bylaw to effectively implement the Town's Vision.

4.4.2 Considerations for Directing Future Growth

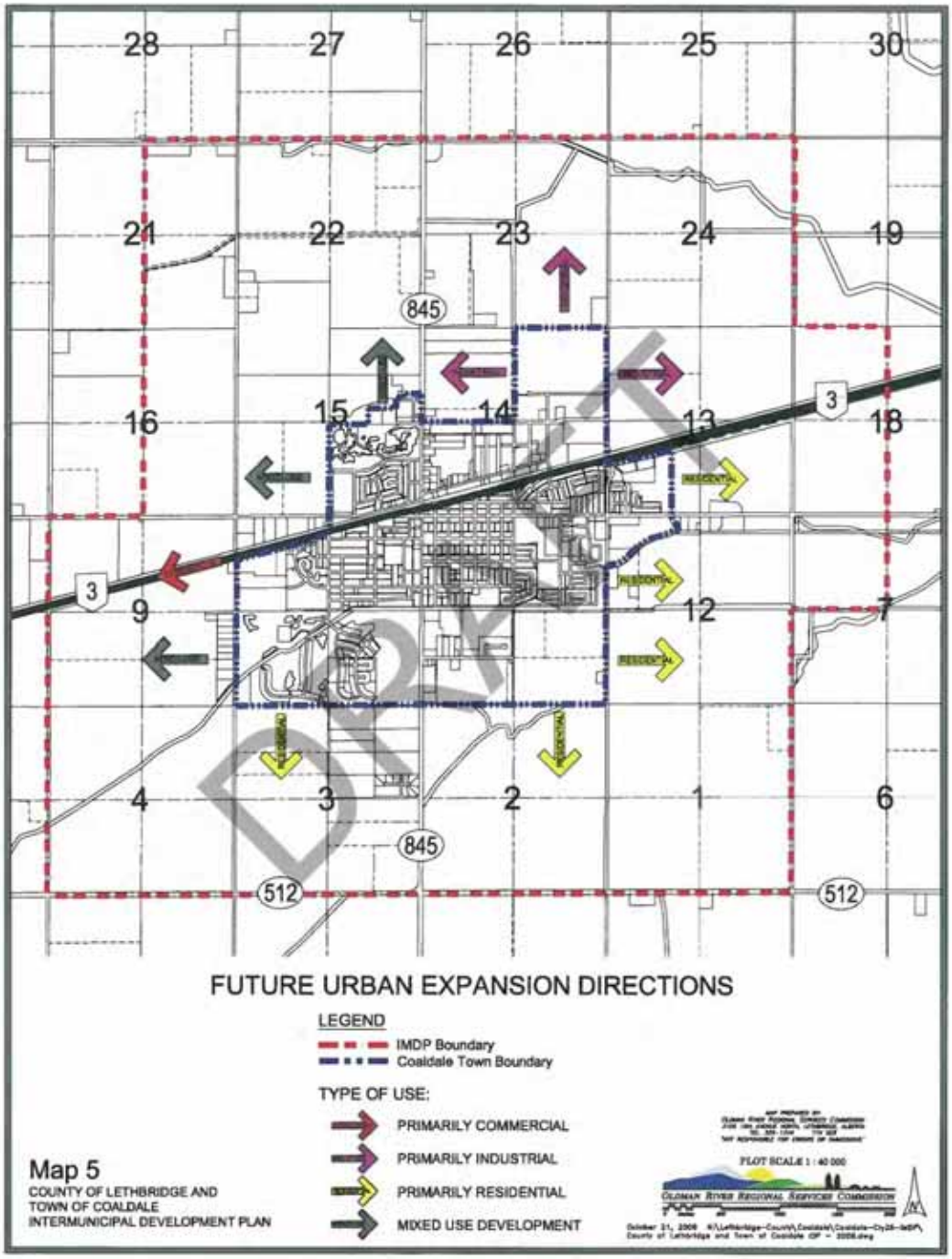
In terms of guiding future urban expansion, there are many factors to consider. Starting from higher priority considerations, to low priorities, the following considerations guide the IDS Town Plan urban expansion concept. As a starting point, Smart Growth principles emphasize;

- directing growth first toward intensifying and infilling existing urban areas;
- defining growth areas located in close proximity to existing infrastructure and servicing, public services such as schools and recreation areas, and major thoroughfares that can be transit serviced;
- preserving valuable farmland while avoiding unmitigated areas of frequent flooding.

Other considerations include:

- ownership patterns and parcel fragmentation;
- the initiative of land owners to develop their lands;
- the desirability of the development area in terms of land form, views, and location;
- and lastly, market and growth study projections.

While taking into consideration direction provided through Coaldale's MDP, and more recently, the 2010 County of Lethbridge - Town of Coaldale Inter-municipal Development Plan, the IDS provides a prescriptive, yet flexible rational for prioritizing and guiding future expansion.



This graphic from the Lethbridge County-Town of Coaldale IMDP provides general guidance for future growth.

4.4.2 Projecting Future Growth

While market growth and preferences are certainly an important consideration for ensuring a healthy tax base and the immediate viability and success of development enterprises, they are not top priorities for long term planning. Town planning must encompass a wider, more complex set of considerations to ensure the bigger picture of social, environmental, economic, and fiscal sustainability- balancing the needs of all stakeholders.

The proposed Town Plan allows for a flexible, yet prescriptive plan for guiding future growth regardless of the pace of development and market preferences. The pattern of the Neighbourhood Unit (discussed later) provides an important tool to guide urban growth at the set increment of a complete walkable neighbourhood, while flexible land uses allow for a variety of market preferences within each neighbourhood. As a result, the IDS Town Plan not only describes where future land uses should be established through urban expansion, but also emphasizes the pattern that those land uses should take.

Following the 2008 North American housing market crash and in response to quickly change market preferences, it has become increasingly difficult to predict the future market. As an illustration of how future growth might proceed, the Town Plan utilizes results and assumptions of recent third party growth projections prepared for the Town of Coaldale based on the "annual percentage compound growth method of population." Utilizing three growth rate assumptions for different market conditions, the study establishes the following projections:

Year	2% Growth	4% Growth	6% Growth
2006	*6 177*	*6 177*	*6 177*
2011	6 820	7 515	8 266
2016	7 530	9 143	11 062
2021	8 313	11 124	14 804
2026	9 179	13 535	19 810
2031	10 134	16 467	26 511

From a study currently underway on behalf of the town of Coaldale, this chart demonstrates potential growth projections over the next twenty years.

4.4.3 The Question of Density

Combining these numbers with an assumed 5.1 dwelling units/acre and 2.5 - 2.9 persons per dwelling, future land needs can be projected. These can be summarized as follows:

YEAR	Population Level		Assumed Persons per D.U.[1]	Total Required D.U.s		Existing D.U.s	New D.U.s Needed		Land Acreage Requirement[2]	
	Low 2%	High 4%		Low	High		Low	High	Low	High
2006	6177									
2011	6820	7515	2.9	2352	2591	2289	63	302	12.3	59.3
			2.7	2526	2783	2289	237	494	46.5	96.9
			2.5	2728	3006	2289	439	717	86.1	140.6
2016	7530	9143	2.9	2597	3153	2289	308	864	60.3	169.4
			2.7	2789	3386	2289	500	1097	98.0	215.2
			2.5	3012	3657	2289	723	1368	141.8	268.3
2021	8313	11 124	2.9	2867	3836	2289	578	1547	113.2	303.3
			2.7	3079	4120	2289	790	1831	154.9	359.0
			2.5	3325	4450	2289	1036	2161	203.2	423.6
2026	9179	13 535	2.9	3165	3836	2289	876	1547	171.8	303.3
			2.7	3400	5013	2289	1111	2724	217.8	534.1
			2.5	3672	5414	2289	1383	3125	271.1	612.7
2031	10 134	16 467	2.9	3494	5678	2289	1205	3389	236.4	664.6
			2.7	3753	6099	2289	1464	3810	287.1	747.0
			2.5	4054	6587	2289	1765	4298	346.0	842.7

[1] D.U. = dwelling unit
[2] Acreage based on 5.1 units per acre
* Analysis done for a 25-year population projection study, using three different calculations of 'persons per dwelling unit'.

Note: This future land needs analysis was done for projections over a twenty-year period of additional land acreage required to accommodate new dwelling units. It does not take into consideration such factors as the existing vacant land acreage, land available for infill development, etc. The low population level was based upon a 2.0 percent annual growth rate, while the high-end population level was projected on a 4.0 percent annual growth increase.

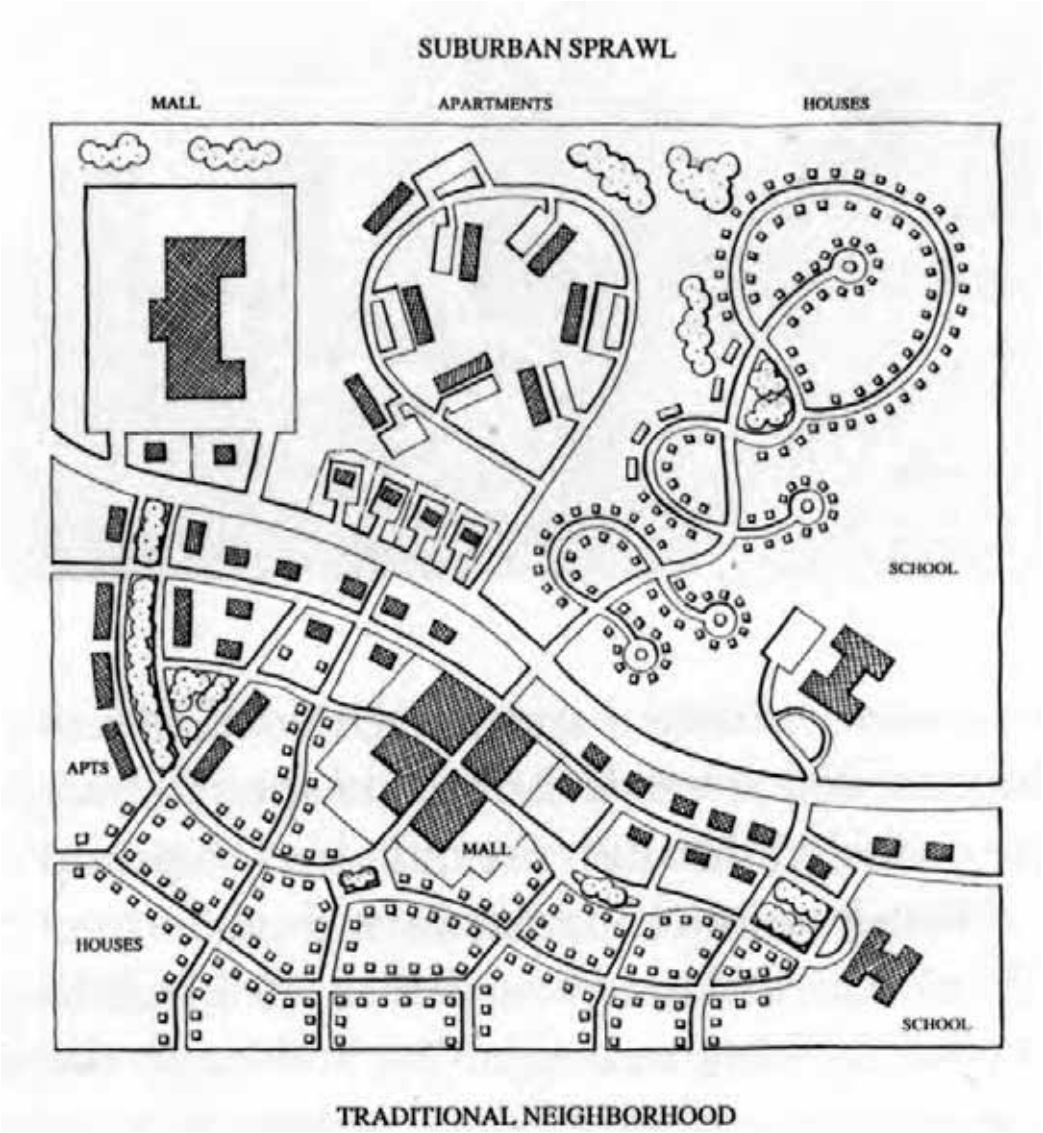
From study currently underway on behalf of the town of Coaldale, this chart demonstrates potential dwelling unit and land acreage requirements based on population projections.

It should be noted that the question of density is widely contested. Smart Growth often seeks a base 8.0-10.0 dwelling unit/acre, and over 14 dwelling units/acre for transit viability. And while these numbers are often appropriate and necessary in larger urban contexts, they are not viable or appropriate in smaller, rural town contexts. Further, these quantitative values do not address the more important questions of pattern, urban form, or character.

As urban municipalities are finding that they can not sustain lower densities- a lesson evident in larger municipalities throughout the world, the sustainability for the relative lower density of smaller towns has a long history. What is important is not the density number, but rather the pattern that the density will take, and the availability of flexibility for future market conditions. For this reason, a density target of 5.0-10.0 units/acre is more appropriate, provided an appropriate development pattern.

4.4.4 Current Development Patterns

After centuries of urbanism, the traditional pattern of walkable, mixed use towns and cities was well established as we began expanding through Western Canada in the late 1800's and the early part of the last century. This pattern is evident in Coaldale's central town grid and main street spine that was laid out by the Canadian Pacific Railway at that time. However, following market turmoil, two world wars, and major technological advances including mass production of the private automobile, we chose a new, more experimental form of development midway through last century.



The traditional walkable pattern of urbanism shown on top was supplanted by the automobile focused pattern shown on the bottom. (Graphic by DPZ&Co.)

Instead of walkability and the integration of land uses, this pattern was based on the private automobile and a strict separation of land uses. To implement this vision we established zoning bylaws and automobile-focused street standards. As a result, the rules that we have in place today do not only define this vision, they are intrinsically born out of this vision. But as we emerge into the new economy of a new century, there are many forces changing the vision for urban development:

- A growing sustainability-driven environmental ethic both in science and more importantly in the consumer market challenges wasteful land consumption and the negative environmental effects of automobiles.
- Soaring gas prices increasingly effect our transportation choices. These prices are only projected to increase, and to date there is no alternative fuel source to replace fossil fuels.

- The negative effects of compulsory driving on public health and safety- including obesity, vehicular deaths, and other variables, as well as for the more than 1/3 of our population who are unable to drive- is now well documented and widely held.
- Both an emerging younger market and our aging populations are seeking more walkable urban communities for affordability, functionality, and quality of life.
- Measured on the bottom line of sustainability, and through more holistic accounting methods-- municipalities are realizing that they cannot pay for the City they have built- and that the actual cost to build and maintain segregated-use automobile-dependent development is too much for the market to justify.
- The recent financial meltdown saw large single-use development projects- both low density subdivisions and tower mega-projects- suffer irrecoverable losses while mixed-use, compact, walkable communities proved resiliency and adaptability.

4.4.5 The Neighbourhood Unit Pattern

Last century's pattern of segregated pods of homogenous land uses separated by an automobile infrastructure are outdated. With a new vision based on Smart Growth and Triple-Bottom Line Sustainability, it will be necessary to write new rules to match our new vision. As a starting point, current best practices establish the compact, walkable, mixed use Neighbourhood Unit as the primary building block for a sustainable region. The Neighbourhood unit is a well established human pattern evident in traditional human settlements throughout the world.

Walkable Neighbourhood Unit

While adjusted for topography and other physical constraints, they are generally shaped by a five minute walk center to edge (approximately a quarter mile, or 400m from center to edge), and are between 80-200 acres. When designed in a walkable manner, this is the size at which neighbors will start to know one another and identify themselves as a neighbourhood. Based on the scale of a pedestrian, it is also the increment where residents can be within walking distance to transit and their daily needs. This allows for the choice to recreate, shop, and even work within walking distance of their home.

The neighbourhood provides the basic structuring element guiding future intensification and urban expansion for the town plan. But the Neighbourhood Unit is more than simply a 400m radius. The ideal Neighbourhood Unit also has a specific urban pattern, character, and mix of land uses. In addition to utilizing the Neighbourhood Unit to prioritize and guide future development, the neighbourhood also serves as an ideal model, from which regulations can be implemented and enforced in response to the unique circumstances of each neighbourhood. Further, regulations should seek to both enforce minimum standards, while allowing flexible entitlements. For instance, buildings on a main street should be required to be street oriented with retail ground storeys, but upper story mixed uses such as office and residential should be allowed by right, but not required.

The model Neighbourhood Unit has the following characteristics:

Compact:

• Neighbourhoods have an appropriate base density to foster community activity, support local retail, and allow for future transit connectivity.

• A clear delineation between public and private space eliminates wasted space.

• Neighbourhoods have a defined centre and edge as generally guided by the 400m pedestrian shed (a five minute walk centre to edge).

• Neighbourhoods size is definite, ranging from 80-200 acres.

• Neighbourhoods should entitle a range of possible densities for 5.0-10.0 units per acre, with a target of 500-1200 dwelling units per neighbourhood. This will allow for approximately 1350-3240 residents per neighbourhood.

- Contiguous countryside and greenways are preserved between neighbourhoods, rather than as fragmented limited-use pathway rights-of-ways that further disperse development.

Walkable:

- A connected network of streets and pathways form a porous block structure allowing direct and multiple routes to destinations for vehicles and pedestrians.
- Buildings are street oriented to engage pedestrian interest and allow for the natural surveillance of public space.
- Streets and public spaces are physically shaped by buildings to create a sense of an "outdoor room".
- Streets are designed to balance character and capacity. Pedestrian facilities (such as sidewalk width and lighting) are appropriately matched to their context.
- A range of uses provides pedestrian destinations and allows the choice to walk.

Complete:

- A diversity of uses including employment, shopping, and residences, and public spaces are within walkable proximity of one another.
- Uses are mixed vertically (residences over shops) and horizontally (around the corner)
- Residential uses are integral and include a diversity of housing types, lifestyle choices, and income ranges.
- The housing diversity also allows for a complete life cycle where all ages are represented.
- A range of public buildings and public spaces are dispersed throughout the plan.

4.4.6 Coaldale's Neighbourhood Structure

The proposed neighbourhood structure is illustrated in **Figure 4.4**. By utilizing the model Neighbourhood Unit as the primary building block, the proposed neighbourhood structure establishes both the prioritization of future urban expansion and intensification, and the level of regulation to be enforced as it relates to achieving the model neighbourhood unit.

As previously discussed, there are many factors to consider relating to guiding future expansion. The proposed concept reflects consideration of existing policy documents, principles of Smart Growth, and the proposed Sub-Regional plan. The numbers indicated on each neighbourhood unit relate to both the level of priority and regulation. Each is described as follows

4.4.6.1 Tier 1: Traditional Town Centre

- Originally designed at a time where the model of the Neighbourhood Unit was assumed, this area already has the appropriate structure, but suffers from the imposition of automobile-focused design standards and the system of segregated use-based land use regulations.
- The infilling, intensification, maintenance of Coaldale's traditional town grid should be the first priority.
- The regulations for Tier One should support, enforce, and entitle the traditional grid of Coaldale to fully realize

and intensify along the principals of its innate Neighbourhood Unit structure.

4.4.6.2 Tier 2: Currently Approved ASPs

- The second tier is defined by more recently approved subdivisions based fully on the automobile oriented regulations of the last century.
- The plans for these areas are established through Area Structure Plans and are entitled to build out according to these plans.
- While many of these subdivisions are partially or substantially complete, there are many unbuilt areas that might benefit from ASP amendments that align them more closely to the pattern of the Neighbourhood Unit.
- In the event that there is a desire or direct recommendation for a development to change in response to the Neighbourhood Unit model, it should be allowed and even encouraged to do so by right, when appropriate.
- Because of their proximity to existing infrastructure and entitlements currently in place, these areas should have a high priority for urban expansion regardless of the urban pattern.

4.4.6.3 Tier 3: Immediate Urban Expansion

- The town should expand into new areas based on the Increment of the Neighbourhood Unit as established through an approved ASP of one or more Neighbourhood Units.
- The third Tier reflects logical immediate expansion based on the Town's major corridors- including the Town's crossroads proposed in the Sub-Regional Plan, proximity to existing infrastructure and services, and other factors.
- The neighbourhood expansion to the west reflects land owner initiative coinciding with expansion along a major corridor and in proximity to existing services. This neighbourhood should form a western town gateway and a unique urban-agricultural interface with the proposed rural greenway proposed between the town and the Agricultural-Industrial Centre. With sensitive planning, this neighbourhood also "completes" the disconnected low density residential parcels on the western edge of town.
- The neighbourhood expansion to the south responds to strengthening the north-south axis of the town along the proposed crossroads. This expansion proposes and alternative to the currently proposed urban expansion to the northwest that is encumbered by the Rail crossing, and is proposed as a water management area as part of the IDS water management strategy.
- A neighbourhood to the east should also be considered along the east-west axis of the town crossroads.
- The third Tier should be held to the full standards of the model Neighbourhood Unit.

4.4.6.4 Tier 4: Future Urban Expansion

- The fourth Tier is the most flexible, but illustrates logical future expansion following substantial build-out of tier 3.
- The fourth Tier should be reconsidered and confirmed as part of a future planning process.
- The fourth Tier should be held to the full standards of the model Neighbourhood Unit. At this time, it is likely that the Neighbourhood Unit standards should also be reviewed to reflect future conditions.

4.4.7 Northeast Industrial

Because of the existing train interface and immediate access to the future Highway 3/Canamex development along the axis of the town crossroads. Like the Agricultural-Industrial Centre, the Northeast Industrial area could benefit from a rail spur right of way. It would also benefit from a refreshed market positioning as a fully serviced industrial neighbourhood. Lastly, in terms of design standards, the Town should consider aspects of the proposed Broxburn Centre, including a more walkable street oriented interface with Highway 3 and select internal streets, and identification of a central public space with complimentary uses.

4.4.8 Northwest Water Management Centre

As proposed by the IDS study, the northwest quadrant of Coaldale is identified as a key component of the overall water management strategy for the sub-region. Using the Birds of Prey wetland complex as a successful model for emulation, the area is proposed to expand the wetland complex for regional treatment and storage. A water reservoir and other management facilities are also contemplated.

4.4.9 Land Use Regulations: A Discussion

The following is reprinted from a position paper by the author:

The challenge of creating sustainable settlements based on the principles of Smart Growth requires different regulatory tools than are conventionally in use in municipalities throughout North America. As identified by the Smart Growth Network, "Traditional zoning ordinances and building codes can inhibit the ability of communities to design projects and implement plans that further Smart Growth." After two decades of policies and initiatives aimed at land use alternative regulatory approaches, current best practices are increasingly demanding a shift from use-based to form-based approaches to land use regulation and development standards.

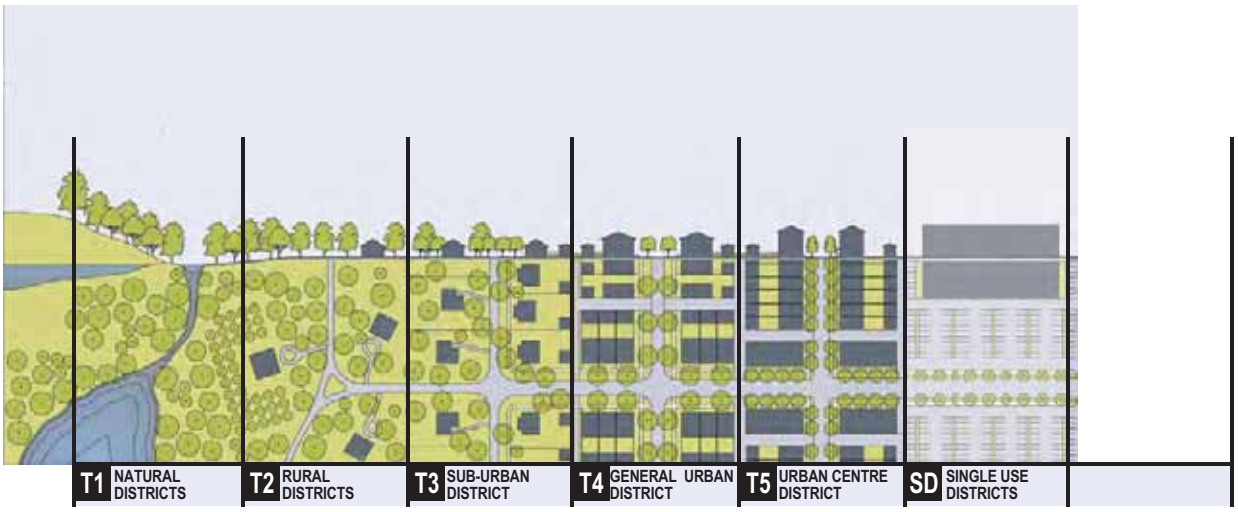
Use-Based vs. Form-Based Regulations

Since the 1940s, the predominant mechanism for regulating land use throughout North America has been through used-based zoning approaches that strictly separates uses, and then set minimum requirements for physical form. This segregation of land uses into single-use pods has become inextricably linked to automobile-focused transportation practices, which are now understood as a distinct and deeply entrenched barrier to effectively achieving Smart Growth based community design.

Over the past two decades, form-based approaches have emerged as a viable alternative to use-based approaches, and have become a widely accepted best practice to implementing Smart Growth and sustainable community design policies. A form-based code regulates for the specific physical outcome, the form and character of a place, rather than simply on minimum-requirements and segregated uses. Where use-based regulations strictly regulate land uses but are more flexible on form (allowing the predominant automobile-focus of our built environment), a form-based regulation more strictly regulates for form and character, with more flexibility in land use.

The Transect

The ideas of Smart Growth and form-based land use regulation introduce a number of new concepts within the Alberta context. One of the most critical new ideas to recently emerge is the rural to urban "Transect". There are many ways that a form based code can regulate. One of the most effective approaches has been regulating by relative land use intensity, most generically: neighbourhood edge, general, and centre.



Originally derived from the study of ecology, the Transect is a continuum of settlement intensity from the most natural/rural to the most urban (shown in figure xxx). When this continuum is divided into zones, the Transect becomes a powerful regulatory land use instrument. The six basic transect zones represent six distinct environments, for which each urban element can be coded to its appropriate context. This includes not only setbacks and building

heights, but elements such as lighting, landscape, signage, and street types. And although there are many common patterns found throughout countries, provinces, and regions, each place has unique climactic, cultural, historical, and local industry differences that require the transect to be customized, or locally "calibrated." The transect described in the subsequent section has been customized for the rural Alberta context and forms the fundamental organizing mechanism for the design of the Hamlet Plan, the Land Use Character and Standards within the Hamlet Plan, and the associated Hamlet Land Use Districts.

The SmartCode: A Basis for Form-Based Regulation

The proposed form-based land use regulations for a model Alberta code utilize components of an advanced model Smart Growth regulation called the SmartCode. The SmartCode is a comprehensive transect-based code representing the sum wisdom of over two decades of research and development focused on creating sustainable alternatives to conventional land-use patterns, and is the most comprehensive and well developed model code of its kind. The SmartCode was originally organized and developed through the efforts of Duany Plater-Zyberk & Company, who after refining the code through several partner disciplines and professionals, released the code freely to the public realm.

4.4.10 Coaldale's Form-Based Land Use Districts

To implement the model Neighbourhood Unit, its recommended that the Town explore a comprehensive form based land use regulation that integrates neighbourhood design, appropriate street standards, and water management standards. In the future, these regulations can also integrate standards for landscape design, green infrastructure, architecture, and numerous other disciplines.

To achieve this, three form-based districts are proposed. Integrated into neighbourhood design guidelines, requiring a minimum percentage of each district within a neighbourhood ensures that the neighbourhood will be "complete" with a range of uses and housing types. Each district represents a different intensity and character along the rural-urban transect and has standards appropriate to each. As illustrated within the Town plan, the proposed form-based land use districts are proposed as follows:

- **T3 Sub-Urban:** The Sub-Urban District is the least intense district within the Hamlet Neighbourhood, primarily characterized by single family residential with front yards and attached or rear garages. Home occupations, civic religious buildings, and minor lodging up to five rooms is also allowed. Encompasses R-1A and R-1B.
- **T4 General Urban:** A mixed residential district that is the predominant district within the Neighbourhood unit. Street-oriented building types include single family residential, semi-detached house, row houses, & small multi-unit buildings, all with narrow front setbacks and parking in the rear. Other uses include corner stores, institutional, and inns.
- **T5 Urban Centre:** Urban Centre is the most urban district, characterized primarily by first floor, street oriented commercial with possible commercial and residential upper stories. Other uses include small multi-unit buildings, institutional, office buildings, and lodging. This district would be applicable to the Downtown, and to accommodate local commercial in each neighbourhood. In both a commercial and residential configuration, it is also ideal for fronting onto major streets, particularly the crossroads axis of Highway 3 and 20th Street.

4.4.11 Water Integration

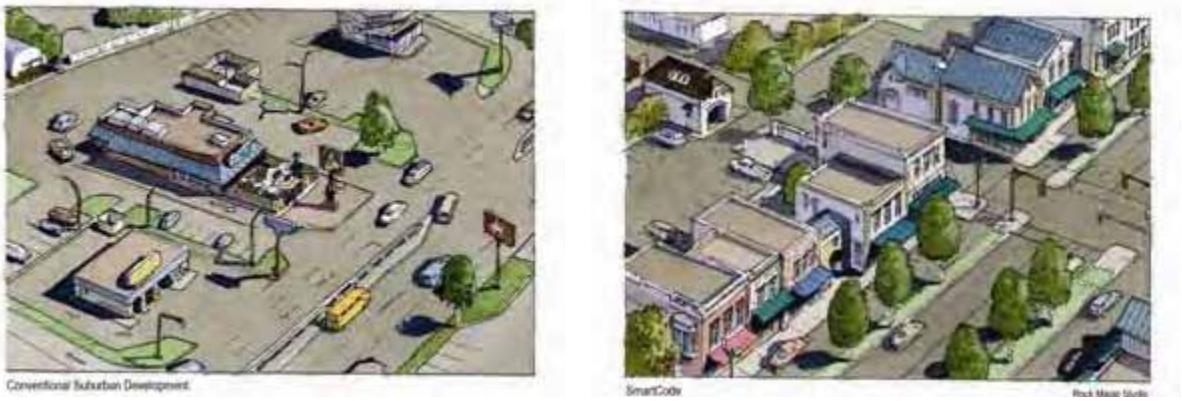
The proposed IDS water management system is integrated within the IDS at two primary scales:

- **Neighborhood Scale:** At the neighbourhood scale, storm water management is first addressed by decreasing overall storm water generation per capita through higher densities and a reduction of automobile infrastructure. Once again emulating the success of the Birds of Prey wetland complex, interconnected overland drainage facilities and wetlands provide natural greenway systems between and sometimes within Neighbourhood Units. Water management areas within neighborhoods should be integrated as green space amenities.
- **Local Scale:** At the local scale of the block and building, water standards for public infrastructure and private lots can be applied to form-based land use districts appropriate to their level of urbanism along the transect. Lower densities should have more stringent on-site standards, where higher intensities may incorporate coordinated district-wide solutions. Water storage, usage, and conservation standards should also be established.

4.4.12 Specific Neighbourhood Design Recommendations

Based on the model Neighbourhood Unit, and immediate development opportunities, the following specific design recommendations are proposed:

- **Highway 3 Interface West:** The West Coaldale ASP defines a largely automobile-oriented development with strictly separated land uses. This area provides a significant Highway Commercial area that will allow for conventional national retailers and other commercial users to develop sites on their model strip-commercial format. As an alternative, a more aesthetically pleasing and pedestrian friendly interface is proposed on the western neighbourhood unit expansion through the use of a multi-way boulevard street section. The multi-way boulevard allows for higher speed traffic to continue in a center lane, with a secondary parallel road that allows for on-street parking, a commercial sidewalk, and commercial buildings to front directly onto the sidewalk.



Buildings surrounded by parking lots are hostile to pedestrians. With a side access lane, mixed use and commercial buildings can be street oriented with additional parking and drive-throughs in the rear. (image by DPZ & Co.)

A multiway boulevard allows faster moving through traffic in the centre lanes, with a slower moving side street for local access and commercial parking. (Image Courtesy Urban Advantage)

- **West Coaldale ASP:** The West Coaldale ASP should be redesigned to adhere more closely to the model Neighbourhood Unit for those areas not currently identified as "Highway Commercial." Changes would include better integration of land uses, definition of the central detention pond as a square fronted onto by row houses, connected roadways both internally and externally, utilization of civic sites such as the school and church to visually terminate streets and anchor the central square, and use of form-based districts.

Garrison Woods (Image courtesy of Canada Lands Corp.)

- **West Coaldale Agricultural Interface:** The concept of urban-agricultural integration has gained increasing interest and application. The idea of "Agricultural Urbanism" provides a unique neighbourhood lifestyle and amenity where community gardening, agricultural cottage-industry production, and markets are integrated into the neighbourhood.

Agricultural Interface (Image Courtesy of DPZ & Co.)

- **South Coaldale ASP:** One of the most important, immediate recommendations for the South Coaldale ASP is to avoid backing land uses onto 20th Street. As part of the proposed Town crossroads axis, this street should be a pedestrian friendly "front door" to the community. The current configuration has single family houses backing onto 20th Street, with a "character wall" interfacing the rear lot line and street. This faces the backend of buildings onto 20th street, and creates a street that is not inviting to pedestrians. It also increases pervious street infrastructure and reduces development viability as these lots are double fronted by full streets on both the front and back. As an alternative, the street should be designed as an urban avenue with row houses and other higher density buildings built facing the street with alley access for parking. Beyond this, the South Coaldale ASP should be encouraged to be redesigned to match the model Neighbourhood Unit Standards and form-based land use districts.

This simulation shows the effects of backing buildings onto a street rather than fronting onto it. (Graphic by Urban Advantage).

- **South Coaldale Expansion:** The South Coaldale tier 3 urban expansion provides an opportunity to create a gateway and front door to the Town from the South as part of the proposed Town crossroads axis. Similar to the

recommendations of the South Coaldale ASP, this street should be designed as an avenue providing a unique address worthy of fronting onto. Forming the junction between two neighbourhoods, 20th street could allow for a small main street with local commercial and possible mixed use supported by on-street parking. Other uses along the avenue could include multi-unit "big houses" that appear as large single family homes and other multi-unit buildings suitable for fronting onto the avenue.

Where the two new neighbourhoods to the south meet, 20th street should have a block of mixed-use with local neighbourhood retail.

4.4.13 Policies and Recommendations

4.4.13.1 Town Scale

- The Neighbourhood Unit should be established as the primary increment of town growth. The town should be structured into neighbourhood units.
- Smart-Growth standards should be established for the Neighbourhood Unit, defining the model criteria for neighbourhood design.
- Using the Neighbourhood Unit as a tool, future development should prioritize infill and intensification of the traditional town grid allowing gradual realization of the Neighbourhood Design Standards.
- The second priority for urban growth should be the completion of developments with approved ASP's. Reconfiguration to adhere to the Neighbourhood Unit should be encouraged. Future requested amendments to established ASP's should utilize the Neighbourhood Unit standards as design criteria.
- The future expansion of the town should utilize the Neighbourhood Unit with full adherence to the Neighbourhood Unit Standards.
- Future urban expansion should direct growth first along major thoroughfares and proximity to existing services and infrastructure, particularly along the crossroads axis formed by Highway 3 and 20th Street
- A form based code should be adopted to implement land uses within the Neighbourhood Unit. Land use districts should emphasize walkable streets, with buildings built close to the sidewalk and parking relegated to the rear

of the lot.

4.4.13.2 Sample Neighbourhood Unit Standards

Neighbourhood Unit Design Standards should be explored, developed, and adopted to guide the design of Neighbourhood Units. The following provides a sample of key standards to be incorporated:

- Establish Neighbourhood Unit: Defined by a 400m radius, a 5-minute walk Pedestrian Shed serves as a general guide for the Neighbourhood Unit. The town should be roughly structured into neighbourhoods as indicated in **Figure 4.4**.
- Neighbourhood Unit Boundary: Using the Pedestrian Shed as a guide, neighbourhood boundaries shall be established, defining neighbourhoods between 35-80 ha. (86-200 acres). Wherever possible, boundaries should reflect logical property lines, natural features, water management facilities, and major streets.
- Existing Conditions: Site design shall respect and respond to existing site conditions. An existing site conditions map should indicate existing natural areas, tree stands, topographic conditions, paths, roads, water courses, walls, and other site features. Existing conditions should also take into consideration edge and surrounding conditions including viewsheds and adjacent land uses.
- Neighbourhood Centre and Main Public Space: As guided by the Pedestrian Shed, Each neighbourhood shall define the neighbourhood centre by at least one Main Public Space located within 250m of the geographic center of the Pedestrian Shed, unless existing circumstances prevent such location, and should conform to a Square or Green Neighbourhood Park type, and shall count toward the required 10% Municipal Reserve.
- Main Public Space Requirements: The Main Public Space shall be equipped with a site suitable for a day care, provisions for a future bus stop, and a third place such as public building, institutional use, or a corner store.
- Block Structure: Neighbourhoods shall be designed as a connected thoroughfare network defining development Blocks not exceeding the sizes indicated below. The perimeter shall be measured as the sum of Lot Frontage Lines. Block perimeter at the edge of the development parcel shall be subject to approval by discretion. For blocks with multiple Hamlet Districts, the block maximum for the most intense district shall prevail.

  T3 Sub- Urban: 1000m

  T4 General Urban: 800m

  T5 Urban Centre: 600m
- Future Connectivity: Future connectivity should be secured at the town edge.
- Neighbourhood Connectors: Neighbourhood centres should be connected to one another, and to the primary thoroughfare network with a street type on a higher order than a local residential type.
- Public Spaces: Each neighbourhood should provide a variety of Public Spaces.
- Public Space Allocation: Public Spaces are public sites permanently dedicated to open space and public building reserves. Each neighbourhood shall dedicate a minimum of 5% of its total acreage to public spaces as a portion of the overall required 10% Municipal Reserve Requirement, indicated on the Regulating Plan as Public Space (PS) and Public Building (PB) and designated as Municipal Reserve.
- Public Space Design: Urban public space standards shall be established for Plazas, Squares, Greens, and Playgrounds. Each Public Space shall have a minimum of 50% of its perimeter in-fronting a Thoroughfare, except for playgrounds.
- Public Buildings: are sites dedicated for publicly held buildings dedicated to government, transit, community gathering, recreation, and culture, and should be located within or adjacent to a Public Space, or at the axial termination of a significant Thoroughfare. Public Building sites shall not occupy more than 20% of the area of each Neighbourhood Unit. Only publicly held public buildings may occupy a public Space.
- Institutional Buildings: Parcels located at important locations such as axial terminations of thoroughfares and along public spaces should be reserved for buildings operated by not-for-profit organizations dedicated to culture, education and religion. The sites are to be sold on the private market and do not constitute Municipal Reserve.

- Playgrounds: Within 250m of every Lot in Residential use, a Public Space designed and equipped as a playground shall be provided.
- Hamlet Districts: Three form-based Hamlet Land Use Districts implement the Neighbourhoods Unit. From lowest density, lowest mixed use to highest density, most mixed use, they are: T3 Sub-Urban, T4 General Urban, and T5 Urban Centre.
- Hamlet District Allocation: The following Districts are available within Neighbourhood Units. The required percentage of each District, measure as a percentage of the gross neighbourhood unit area, shall be allocated as follows:

  T3 Sub-Urban Edge: 10-30%,

  T4 General Urban: 25-60%

  T5 Hamlet Centre: 5-20%, Except for Downtown: As needed.

  Public Space and Other Municipal Reserve: 10%

  Agricultural and Natural Land (Environmental Reserve): No Limit
- Minimum Densities: Individual Land Use Districts establish parcel-based density maximums. To ensure a base density appropriate for future transit support and community vibrancy, the following minimum densities should be met for each District Allocation:

  T3 Hamlet Edge: 10 units/ha (4 units/acre)

  T4 Hamlet General: 15 units/ha (6 units/acre)

  T5 Hamlet Centre: 15 units/ha (6 units/acre)
- Minimum Other Uses: To ensure a mix of uses, non-residential uses are required within each Hamlet District Allocation, measured as a percentage of gross building square footage or gross parcel square footage. Other uses include public and institutional buildings, retail, office, and lodging.

  T3 Hamlet Edge: 5%

  T4 Hamlet General: 5%

  T5 Hamlet Centre: 20%
- Neighbourhood Density Overlay: Neighbourhood Plans may institute a maximum density overlay in response to servicing constraints, but should meet minimum densities.
- District Allocation and Density Measurement: All Districts are measured to the center line of public thoroughfares.
- Designations for Mandatory and/or Recommended Retail Frontage: A special, non-required designation requiring or advising that a building provide a Shopfront at Sidewalk level along the entire length of its Private Frontage. Mandatory retail frontages also allows for single-story buildings, provided that the mandatory frontage does not exceed 40% of the total frontages of the Hamlet Centre Allocation.

4.4.13.3 North Industrial

- A rail spur right-of-way should be established for the existing Northeast industrial area to protect future rail integration and expand the target market.
- Following substantial completion of existing industrial, additional expansion should continue to the north.
- The design recommendations for the Broxburn Centre should be considered for the town's industrial growth.

4.5 County Residential Growth

4.5.1 Overview

The past several decades have seen the emergence of low density non-agricultural residential acreages in rural

counties throughout North America. Often serving as automobile-dependent bedroom communities, the proliferation of this low density "Country Residential" pattern leads to many environmental, social, and economic consequences.

To offset these impacts, cluster development practices and Smart Growth practices are strategies that have been identified by the County's Integrated Sustainability Plan. Further, the County of Lethbridge Municipal Development Plan provides guidance for locating future Country Residential development to conserve agricultural land and increase infrastructure efficiency. Building from this policy, the IDS provides more detailed strategies for the pattern of County Residential Growth.

4.5.2 First Direct Growth to Existing Centres

Respecting the locational criteria of the County Municipal Development plan for country residential, the first position of the IDS is to discourage further low-density country residential subdivision and instead direct this growth to existing clusters. This also supports the idea of the natural/agricultural greenbelt surrounding the Agricultural-Industrial Centre that would be compromised by disconnected industrial, commercial, and residential uses alike.

4.5.3 Beyond Grouped Country Residential: The Hamlet Cluster

Where new residential clusters have been deemed appropriate, the Hamlet Cluster settlement pattern is encouraged. The Hamlet Cluster is a modern interpretation of the traditional rural Hamlet, taking on many of the characteristics of the ideal Neighbourhood Unit (see section 4.4.5). Key to this concept is the idea that the Hamlet Cluster can intensify and grow into a full neighbourhood/village over time should that be desired. The Hamlet Cluster has the following characteristics:

- A central common space in the form of a large green or the smaller, more formal square provides a centre to the cluster. This common space can accommodate passive recreation, community gardening, community gathering, a multi-purpose community building, churches, and playgrounds.
- A diversity of lot sizes from larger agricultural parcels to smaller "village lot" as small as 1/4 acre at the Hamlet's centre. Townhouses and multi-unit "mansion units" may also be considered around the central green.
- The house is vertically proportioned, typically two stories with a front porch or stoop, and placed close to the street to offer a 'public face' that frames in the street as a public space.
- Although buildings are closer together in the hamlet pattern, the ability to have clear country views and privacy to the rear can be achieved for many of the lots, where the front porch has an "address" on the street.
- Garages may be attached but are set back from the street or accessed from a rear lane.
- An additional suite or workshop may be provided above a detached garage or separate outbuilding.
- Larger parcels and agricultural uses are located at the edge of the cluster. On these parcels, the house may be larger, have additional outbuildings, and are free from setback constraints.
- A "cross roads" formed by two major roads through the community can allow for small local and rural commercial uses.
- Streets connect internally to form a network and allow for future expansion.

4.5.4 Policies and Recommendations

- Lower density residential uses should be directed to existing settlements where they can form the edges of a Neighbourhood Unit.
- Hamlet Clusters shall be based on the Neighbourhood Unit wherever possible.
- A central common space in the form of a public green or square, and secured as Municipal Reserve, shall be surrounded by a road and fronted by the highest density parcels in the clusters.
- The central common space can accommodate community buildings, community gardening facilities, playgrounds, storm water management facilities, and both active and passive recreational facilities.
- Range of Lot sizes shall be provided with parcels ranging from at least 1/3 of an acre to 4.0 acres.

- Where appropriate, parcels around the common space shall consider smaller single family parcels, townhouses, small multi-unit buildings (mansion flats appearing as a large single family house), institutional uses, and limited local commercial.
- Buildings on parcels less than 1/3 acre shall have a maximum front setback of 6.0m and a minimum of 3.0m. Parcels surrounding the common space shall have a maximum front setback of 3.0m and a minimum of 1.5m.
- Porches and stoops may encroach 50% into a front setback, except where located around a common green where they may encroach 100%.
- All parcels shall be allowed one secondary unit above a detached garage where available, or an outbuilding where the garage is attached to the house.
- Front accessed garage doors shall not extend forward of the front facade and shall not exceed 25% of the front facade area.
- Where located around the common space, front accessed garages shall be setback 6.0m from the front facade or accessed from a rear lane. Front accessed garages are not permitted on parcels less than 12.0m.
- All streets shall be connected to form a network with block perimeters no larger than 900m measured at the front property line.
- Hamlet Clusters shall be designed to allow for future intensification where appropriate.
- Streets at the edge shall allow for future street connections no less than every 220m.
- Existing Country Residential subdivision shall be considered for intensification into a Hamlet Clusters in exchange for common space.
- Hamlet Clusters shall incorporate aggressive storm water management techniques including, but not limited to rain water collection, permeable streets and driveways, rain gardens, overland channeling, and on-site retention and treatment.

A Hamlet Cluster provides for common space and a range of lots sizes including agricultural parcels.

5.0 Transportation

5.1 Existing Transportation Network - Corridor Study Area

The analyzed transportation network centers on and is bisected by the existing alignment of Highway 3. The Study Area extends from the eastern boundary of the City of Lethbridge to the east of the Town of Coaldale. Its south boundary coincides with the Twp. Rd. 7 while the north boundary follows Twp. Rd. 10.

The existing road network is shown on the attached **Figure 5.1.1**.and includes;

- Provincial Highways;
    - Highway 3 bisecting Study Area from southwest (SW) to northeast (NE),
    - Highway 4 alignment which crosses through the southwest corner of the study area between the City of Lethbridge boundary and Twp. Rd. 7,

    It should be noted that both Highway 3 and Highway 4 within the Study Area form part of the CANA MEX Trade Corridor, the Transportation Corridor connecting Canada, the United States, and Mexico.

    - Highway 512 alignment which follows east of the City of Lethbridge boundary up to Twp. 90 and then north intersecting Highway 3 approximately 8 km (five miles) east of the Town of Coaldale,
    - Highway 845 which follows the north – south road alignment connecting Highway 4 to Highway 3. It intersects with Highway 3 in Coaldale and then heads north towards Lomond.
- Local Road System;
    - The Provincial Highway System is complemented by the local grid road system with roads spaced 1 mile (1.6 km) in the east-west direction and 2 miles (3.2 km) in the north-south direction.

    It should be noted that the local grid road system is not continuous throughout the Study Area.

5.2 Transportation Studies

A number of transportation network studies have been completed for this area. The most recent studies include:

- Functional Planning Study – Future Highway 4 Interchange with Existing Highway 3:10 – Focus April 2008,
- Highway 3:10 Operational Review/Scope Study - Lethbridge to Coaldale - McElhanney Consulting Services Ltd., May 2004,
- Highway Network Study Lethbridge to Coaldale – ADI Limited, November 2009,
- Highway 3:10 – Lethbridge to Coaldale Service Road Network Study – ISL Engineering March 2009.

In addition, Alberta Transportation (AT) has carried out a Functional Planning Study for the realignment of Highway 4 east of Lethbridge and a Functional Planning Study for the City of Lethbridge North Ring Road.

Results of and recommendations made in the above studies were analysed and used in the development of the preliminary skeletal transportation network concept for the Study Area as discussed in the subsequent sections.

5.3 Future Network Concept for the Proposed Corridor Development

Based on the results of the Transportation Studies and review of the long term plans for the area, the future long term skeletal network was identified for the area and is shown on **Figure 5.3.1.**

It includes;

- the existing transportation network,
- the proposed realignment of Highway 4 east of the City of Lethbridge,
- North Ring Road and the proposed access schemes for Highway 3,
- Highway 4 and North Ring Road within the confines of the Study Area.

5.4 Access Management

5.4.1 The Existing Access Management Scheme

The transportation network in the Study Area is under the jurisdiction, management and control of three Road Authorities;

Alberta Transportation is responsible for the numbered highways,

The County of Lethbridge is responsible for the local network and

The Town of Coaldale is responsible for the street system within the Town's boundaries.

Consequently;

- The existing access management scheme in the case of Provincial Highways is defined by the Alberta Transportation Access Management Guidelines and included as a separate Section in the Alberta Transportation Highway Geometric Design Guide defining access control measures for highways under jurisdiction and control of the Minister of Transportation.
- The local road system is under the jurisdiction of the County of Lethbridge and the County has control of access on this part of the system while
- The Town of Coaldale is responsible for the access control as related to the Town's street system.

5.4.2 The Future Access Management Concept

The future access management scheme in the case of the skeletal network was identified following the analysis of the results of the transportation studies and review of the future functional designation of the network links. The results of this review indicate that

- Access to Highway 4 and North Ring Road will be limited and provided at the identified interchange locations.
- Access to the existing Highway 3 alignment will be limited to 1 mile (1.6 km) spacing and will be provided at signal controlled intersections.
- Access to the lands north and south of Highway 3 located along the existing Highway 3 will be provided by the local road system complemented by the possible service road system.
- Spacing of the intersections located north and south of the Highway 3 should be adequate to provide for accommodation of queues and proper operation of the CP line crossings. It is assumed that a 400 meter desirable (300 meters minimum) spacing will be maintained between the first intersections on the north south roads, north and south of the existing Highway 3 and the Highway 3 alignment.
- Access to lands abating Highway 3 should be provided via the back road system or frontage road system connecting to N/S Highway 3 connectors not closer than 400 m off of Highway 3 or CN North right-of-way boundary.
- Modern roundabout intersection layouts should be pursued as the first configuration option before the traffic

signal control is considered.

- All key standard four legged and “T” type intersections should be flared and include a bypass lane(s) in their configuration.

5.6 Network Concept for the Proposed Development

The results of the analysis of the future transportation network supported location of the nodal development along the existing Highway 3 alignment. Following further analysis the proposed location for the future development node was selected in the vicinity of the future Highway 4/current Highway 3 interchange as shown on **Figure 5.1.3**.

To accommodate the proposed development node and provide for efficient vehicular traffic circulation, intensification of the future network in the area will be required. The proposed modification of the network following completion of the development node is shown on **Figure 5.7.1**. It includes introduction of the collector road system to the east and west of the future Highway 4 alignment, connecting future development to the original skeletal road system. The proposed collector road system accommodates the existing development plans as well as the future land uses assumed for the area. It also supports identified long term access management scheme.

5.7 Pedestrian and Bicycle Accommodation

Accommodation of other modes of transportation such as bicycles and pedestrian within the confines of the transportation rights- of way parallel to the fast flowing vehicular traffic was not considered the most desirable solution. Consequently a pedestrian bicycle trail system was developed as shown on **Figure 5.1.5**. It will provide a pedestrian/bicycle connection between the City of Lethbridge and the Town of Coaldale along the private lands and SMRID canal, with direct connections to the proposed development node and the Alberta Birds of Prey Centre. The crossing of the future Highway 4 alignment will be accommodated as part of the SMRID canal crossing. An additional crossing of the Highway 4 Alignment is proposed at the future Highway 3 interchange.

6.0 Stormwater Management

6.1 INTRODUCTION

Rather than viewing stormwater management as a liability and a nuisance, it can be transformed to become a catalyst that will attract investment, beautify a community, increase tourism, protect the environment, and create recreational and other opportunities. The Town of Coaldale and the County of Lethbridge are facing the need to think creatively about how they approach stormwater management as flooding events such as those seen in 1978, 1995, 2002, 2005 and 2010 have become an increasing threat to the region and current infrastructure is insufficient to manage large storm events. In addition, an increasing population and pressure to develop lands in the region have helped to create the impetus to successfully manage stormwater on affected lands.

Recognizing in 2009 that the solution to the region's flooding problem was not something which could be handled in isolation, the Town of Coaldale and the County of Lethbridge initiated the Integrated Development Strategy (IDS). The main goal of the IDS is to develop a concept plan for the region's stormwater management in conjunction with plans for future water supply, wastewater treatment, land use planning and economic development goals. Various opportunities have been identified for integrating water reuse, education and recreation into the stormwater management facilities, with the primary goal being storage for severe flood events and drought conditions.

Together, the Town and County recognize that if done right and in a comprehensive fashion, they can become recognized leaders in water management, a "Best Practice" for others to follow.

It is recognized that many efforts are underway at the local scale to improve the drainage problems in the Town of Coaldale and that the current, existing state related to perimeter drains in the older neighbourhood is well understood to require significant funding to improve the situation. Given the on-going efforts, the IDS study excludes discussions on these drainage relief activities.

Figure 1 Flooding at the Confluence of the Malloy Drain East of the Town of Coaldale, June 21, 2010

6.2 Project Background

The IDS Study Area includes the Malloy Drainage Basin which encompasses an area of approximately 21,662 hectares within the County of Lethbridge and is centered on the Town of Coaldale. It is roughly bounded to the north by Township Road 9-4, to the east by Stafford Reservoir at Range Road 182, to the south by the SMRID main Canal at Township Road 82 and to the west by the North East Lateral at approximately Range Road 210 as shown on Figure 3 Study Area.

A thorough review of existing reports and studies on stormwater management in the region was collected and is presented in Appendix D as the Stormwater Summary for the Integrated Development Strategy. Additional information was collected from local stakeholders, residents, business owners and historical records, and a four-day Charrette was held by Placemakers Inc. in February 2011 to determine the location and extents of future develop-

ment in the region. A map showing the results of the Charrette is shown as Figure 4.

The IDS Study Area is home to some of the best farmland in Alberta due in part to the presence of the extensive irrigation network owned and operated by the St Mary River Irrigation District (SMRID). SMRID infrastructure in the region includes a mix of supply canals, drains, underground pressured lines and reservoirs. Unfortunately, the practical use for evacuation of excess surficial runoff is contrary to the design of the supply system as the canals in the downstream direction shrink in size and capacity as irrigation water is withdrawn where as the need for capacity for stormwater flow increases along a system. SMRID has stated previously that they *"are not a drainage authority and are not responsible for the . . . runoff that the Malloy System has received"* (MPE, 2010).

> *The earliest irrigation canals followed the natural terrain where the drainage course was structurally enhanced to a channel-like structure to assist with irrigation delivery and irrigation drainage outflow. These initial canals followed the natural drainage patterns as this was the easiest and least expensive method of delivering water.*
>
> *The evolution and development of irrigation was primarily driven by the landowners who wanted greater control of water and access to land situated in natural lows and drainage courses. With continued advances in farming and irrigation techniques, present day farmers expect and aspire to maintain total control over the application of irrigation water. Over time, smaller canals structures were removed from the natural drainage courses and relocated to the perimeter of land parcels. Here, the canal structures met and joined with road drainage systems, creating an intensified drainage system network.*
>
> *With advances in pipeline technology, the SMRID has constructed buried pipelines to more efficiently deliver significant irrigation flows currently served by smaller canals. The removal of these smaller canals from the land base has an immediate and significant effect on the land's drainage characteristics. Landowner's seek to "reclaim" the land occupied by the former canal structure allowing fewer restrictions to cultivation and the implementation of pivot irrigation systems. During storm events, a reclaimed area does not have the previous capacity, or control, resulting in altered flows to other drainage systems or road ditch networks.* (Malloy Drain Master Drainage Plan)

The pioneering efforts to use natural drainage systems to enhance the delivery of water and bringing these lands to a most productive agricultural status nowadays is precisely the challenge when drainage from adjacent lands are no longer "welcome" to be conveyed by that same system. Hence the strategy presented in this study; i.e., separate the drainage system for ***excess*** of water from the irrigation system that has converted some of the natural drainage systems to function as a delivery system and address the ***shortage (demand)*** of water.

Figure 2 The South Coaldale Lateral

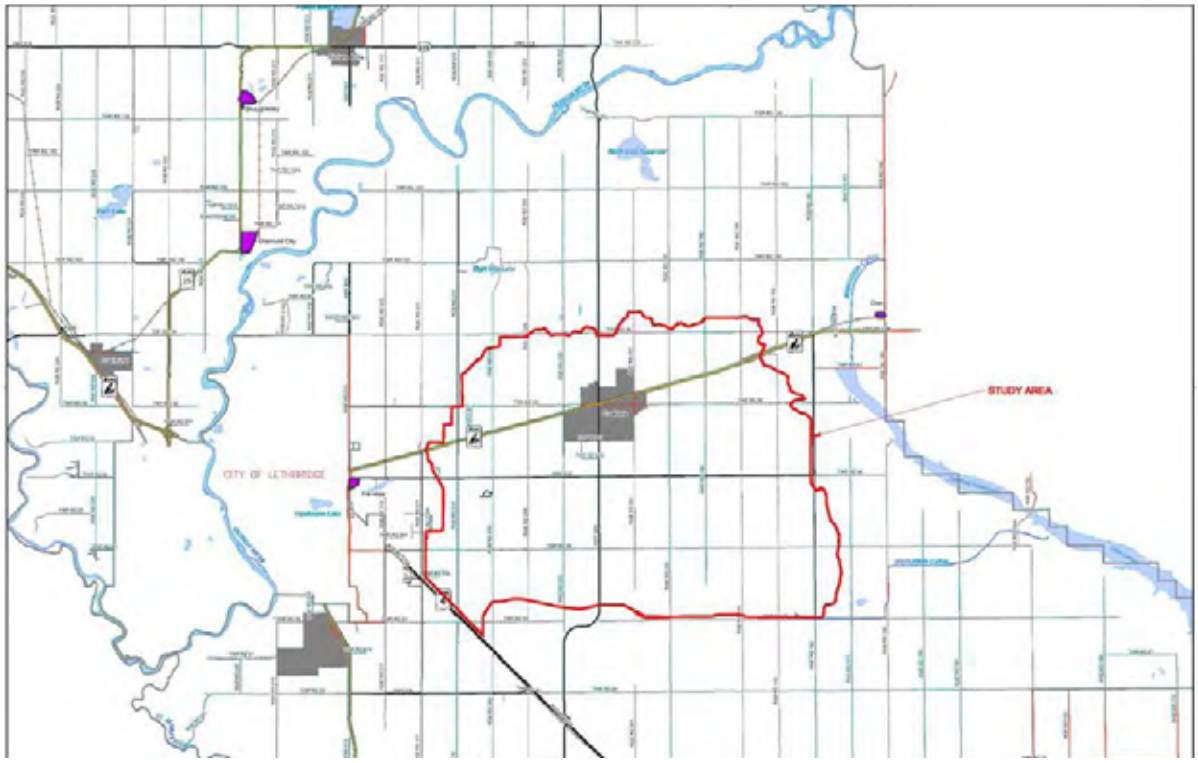


Figure 3 Study Area (base plan courtesy of the County of Lethbridge)

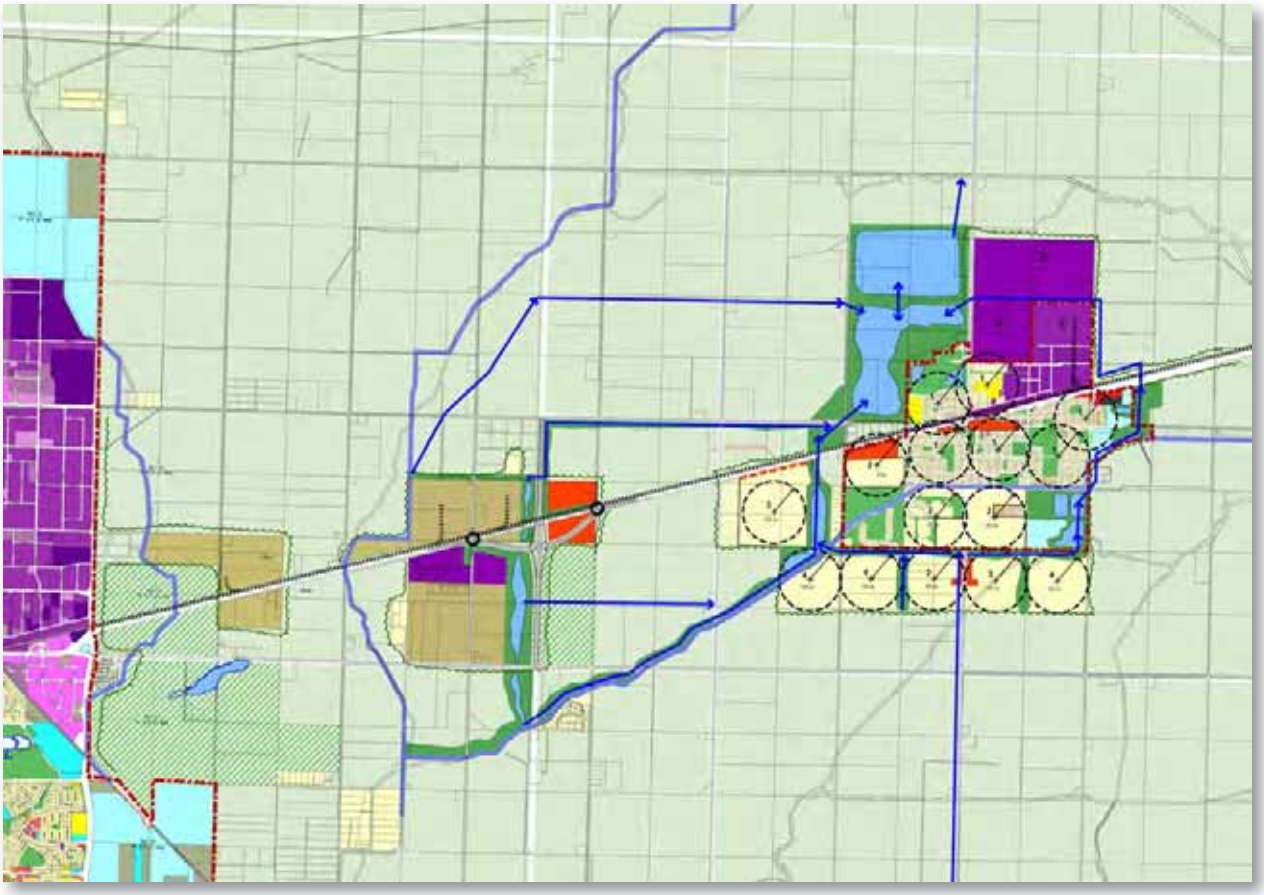


Figure 4 Future Land Development in the Lethbridge-Coaldale Corridor (courtesy of Placemakers)

6.3 History of Flooding in the Malloy Drainage Basin

Runoff from the Town and County is primarily collected either within the SMRID canals and drains, the Birds of Prey wetlands or the Main East Storm Pond within the Town. There are five main locations where severe storm events cause inundation which becomes a safety concern and often causes property damage (ranked in order of severity):

1. South Malloy Lake at the confluence of the Malloy Drain and the South Coaldale Lateral
2. In the agricultural lands north and west of the Birds of Prey Centre
3. Along the Cheese Factory Drain and into the industrial park in the Town of Coaldale
4. West of the Town of Coaldale and south of Highway 3 at the west Town limits
5. Highway 845 between Highway 512, the southern Town limits and south Coaldale.

Localized flooding also occurs at the Main East Storm Pond within the Town of Coaldale as release from the pond is restricted by the SMRID to only be released after the peak of the storm. This is in order to reduce flooding downstream and to prevent Stafford Reservoir from exceeding capacity. This operational limitation causes backwater effects further upstream within the Town's underground and surface stormwater management infrastructure.

In Appendices A and B, areas subject to frequent inundation in the County and Town respectively have been identified based upon visual observations in June of 2010 and several studies of the region, such as the Malloy Drain Master Drainage Plan done by MPE Engineering in 2010. To highlight precipitation depths from severe storms or long duration wet weather conditions recorded data summaries were collected. Tables 1 and 2 below compare the median annual precipitation for the region to historical storm events.

Table 1 Average Monthly Precipitation (City of Lethbridge)

	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec	Total
Average Precipitation (mm)	17.6	11.6	24.0	31.3	53.5	63.0	47.5	45.8	39.6	18.9	16.9	16.7	386.3

Table 2 Major Storm Events in the Study Area (Source: Environment Canada for the City of Lethbridge)

Date	Precipitation (mm)	Storm Duration
1978		
August 1978	140.5	30 days
1995		
June 6, 1995	55.0	24 hours
June 1-30, 1995	102.4	30 days
2002		
June 8-10, 2002	174.8	72 hours
June 1-30, 2002	251.2	30 days
2005		
June 1-30, 2005	272.0	30 days
2010		
April 1-30, 2010	85.5	30 days
May 1-31, 2010	123.0	31 days
June 1-30, 2010	127.5	30 days
April to June 2010	336.0	3 months

As can be seen from the record, the severe flooding which has been observed in the study area is most often due to prolonged periods of precipitation, not necessarily a single event. This is due to the extremely flat slope of the land, the use of irrigation water which keeps the soil moist, and insufficient capacity of the drainage system (whether designed and constructed for or not) to convey the runoff from the land.

The impact of sustained periods of wet, cool weather pose a serious concern for agriculture in the region. The photos below show the extent of the floods in June of 2010 and their impact on local crops where many failed to mature due to the cool, wet summer.

Figure 5 Flooding at the East Portion of the Town of Coaldale, June 21, 2010

[1] A 24h, 1:100 year single event using the City of Lethbridge Intensity Duration Frequency (IDF) curve is associated with 109.86 mm precipitation

Figure 6 Flooded Farmland in the County of Lethbridge, June 21, 2010

Figure 7 Severe storm events in the spring of 2010 led to late harvests; some crops failed to germinate and/or mature (photo taken October 2010)"

6.4 Water Quality Concerns in the Malloy Drainage Basin

Two main aspects of water quality within the Malloy Drainage Basin are of a concern to the region currently. The first is the impact of runoff from agricultural lands, and the second is the impact of runoff from new urban developments.

The concern with the impact of runoff quality on irrigation canals is growing within Alberta. Agricultural runoff is often associated with chemicals applied to the land (insecticides, chemical fertilizers, etc.) and animal waste, especially from confined feeding operations. High in nutrients such as nitrogen and phosphorus, the inflow of runoff encourages growth of algae and vegetation within the receiving waters and canals and is considered undesirable from the point of view of many irrigation districts.

Two case studies are presented below illustrating the quality of agricultural runoff and the measures other irrigation districts have taken to prevent future development from further impacting the water supply.

6.4.1 Case Study: Vista Meadows

Located south of Highway 512 along Range Road 205, Vista Meadows is a cluster of small acreages within NE ¼ Sec 31-8-20-W4M and adjacent to the Coaldale Lateral. When in development, it was agreed by UMA Engineering Ltd on behalf of Gibraltar Mortgage Ltd (May 19, 1999) that:

1. *"Drainage water is to be directed to a retention facility prior to release into the SMRID canal. The retention facility is to be of sufficient size to retain the 1:5 year rainfall event.*
2. *Water quality in the retention facility is to be tested periodically to ensure that it meets irrigation water quality guidelines costs to be borne by subdivision owners.*
3. *The SMRID is to be advised prior to releases being made from the retention facility."*

Westhoff was contacted in 2009, to undertake a drainage analysis to explore options to comply with the agreement with the SMRID and lift the concerns related to runoff from the Vista Meadows residential development reaching the SMRID canal. During the project evaluation, Westhoff collected water samples during rainfall events to test the quality entering the site from the neighbouring agricultural lands for comparison to runoff quality from the Vista Meadows pond. Water quality testing results indicated that the agricultural runoff was the overwhelming source of the pollutants entering the SMRID canal, and that in fact the water quality coming out of the development was of better quality than what was running off from the irrigated fields.

6.4.2 Case Study: Western Irrigation District

The Western Irrigation District (WID) is located east of the City of Calgary within the Rocky View County and Wheatland County. It has been heavily impacted by development pressures from the City of Calgary, the Town of Chestermere and the Town of Strathmore where many developments drain into the irrigation canals. As per the WID Storm Water Quality Guidelines (MPE, 2007):

"These guidelines are rooted in the fact that the canal system is uniquely sensitive. It is not designed as a traditional drainage system. Channels decrease in size moving downstream. Spills and drains at the bottom end of the system have limited capacity. Some parts of the system include natural channels. Most importantly, canals are more vulnerable than natural receiving streams:

- *Canals are set for fixed irrigation flows, not for unpredictable runoff surges from urban areas.*
- *Little natural buffering capacity to cope with excessive nutrient and pollutant loads.*
- *High nutrient loads lead to rapid and excessive weed growth that choke channel capacity each year.*
- *Hydraulic design capacity drops downstream, opposite natural streams and drainage channels.*
- *More pollutants and nutrients enter the canals moving downstream, increasing concentrations.*
- *Cumulative effects lead to highest and most harmful concentrations near the end of the system."*

To protect the canals and receiving bodies, including the Bow River, and ensure the control and reliability of the system the WID has implemented the following water quality targets:

Table 3 WID Water Quality Targets

Parameter	District-Wide Target
Total Phosphorus (TP)	0.03 mg/L
Total Suspended Solids (TSS)	10 mg/L
Bacteria	100 per 100 mL Fecal Coliforms
Salinity	0.6 mS/cm Electrical Conductivity (EC)

It is noted that these targets are more stringent than the current Alberta Environment standards for surface water quality, while noting that parameters for urban runoff have typically only focused on the reduction of Total Suspended Solids (TSS).

6.4.2.1 Water Quality Enhancement

The proposed stormwater management concept presented in this report will inherently improve the quality of the water which leaves the region. That is, storm water will be routed to a wetland-type storage and treatment facility which will remove sediments, reduce nutrient loading and disconnect the drainage system from the SMRID irrigation system.

6.5 Regional Stormwater Management System

In order to reduce inundation during storm events and sustained wet periods, a stormwater escape route from the region is required. The Oldman River is the most viable receiving water body in the region as Stafford Reservoir is undesirable from both the quantity and quality standpoint. It has neither the capacity to capture nor to treat large stormwater runoff volumes, nor does the SMRID have the desire to do so. To resolve this conflict an integrated regional storage and wetland system with a force main to the Oldman River is proposed.

The force main to the Oldman River will provide a means of evacuating excess stormwater from the region resulting from severe storm events. The associated volume of runoff from the rather large catchment is too much to be simply captured and stored at these times. It is emphasized that the force main may not only be used in situations of extreme runoff generation; it will be operated to optimize and balance the hydrologic signature for wetland function, ensure capacity of the facility as a storage facility, a water supply source for industrial uses, and an educational/recreational site.

Linkages to the existing Town of Coaldale infrastructure are proposed in order to completely disconnect the system

from the irrigation canals and maintain the capability to reuse the water. And by capturing the overwhelming majority of the stormwater runoff from the land, pressures downstream and throughout the irrigation system will be reduced.

6.5.1 Force Main to the Oldman River and Increased Storage Capacity at the Birds of Prey Wetlands

One of the fundamental components of the proposed Regional Stormwater Management System for the County of Lethbridge and the Town of Coaldale is the diversion system to the Oldman River. It consists of the force main to the Oldman River from an expanded wetlands storage facility at the Birds of Prey Centre on the northwest edge of the Town of Coaldale. This drainage relief system is shown on Drawing SWM03 and SWM04.

Figure 8 Existing Birds of Prey Stormwater Treatment Wetlands

The wetland expansion at the Birds of Prey will not only be a location for the storage and treatment of stormwater, but also a viable educational and recreational resource. Building upon an already proven system located at the collection point for the region's runoff, i.e., low point, the Birds of Prey Centre is only logical for expansion and to provide for additional storage capacity.

A number of options are available for integration into the above noted proposed storage and discharge system:

Option A: The St. Mary River Irrigation District (SMRID) has identified the need for an escape route from their supply system during periods of severe rainfall. The force main which is proposed for the Regional Stormwater Management System will run approximately 800m west of the SMRID's North East Reservoir along Highway 845. There is potential for a shared outfall into the Oldman River from this point north.

Figure 9 SMRID North East Reservoir

Option B: As an expansion of Option A, in periods of drought, water could be pumped from the North East Reservoir to the expanded wetlands in order to keep their aesthetics and treatment qualities (provided an agreement with the SMRID could be reached).

Option C: Provide connections to the force main for local users (similar to irrigation supply)

Option D: Augment the SMRID water supply via the Cheese Factory Drain. Excess runoff captured by the expansion of the Birds of Prey can still be released into the Cheese Factory Drain as is done now and address periods of low storage volumes in Stafford Reservoir.

Option E: Purchase a portion of the Cheese Factory Drain which is within Town limits and turn it into a linear pond, connected to the Birds of Prey expanded wetlands facility. The conversion of the Cheese Factory Drain into a linear pond simply adds more storage capacity for excess runoff during wet periods or heavy rainfall events. Given the location of this existing system, integrating/expanding the regional pathway route to the north should also be regarded as a benefit, albeit secondary.

Option F: Decrease the lands required for the expanded wetlands by increasing pump capacity or pipe size. This would have an effect on the availability of water for reuse

Option G: If the lands immediately west and north of the existing Birds of Prey wetlands cannot be secured for proposed expansion, the location of the storage facility could be in the lands farther to the north and west which have been identified as “frequently inundated” by the Malloy Master Drainage Plan (MPE, 2010). It is noted that integration into the Birds of Prey facility may need to be provided by additional pathways for public access

A tentative site layout concept has been developed by Browning Horrocks for the regional stormwater storage facility:

Figure 10 Conceptual Masterplan for the Expanded Alberta Birds of Prey Nature Centre

6.5.2 Connecting the Town of Coaldale to the Escape Route

With the diversion system to the Oldman River in place, it is then possible to create a connection for the storm-water infrastructure within the Town of Coaldale. The Main East Storm Pond is located within the Parkside sub-division on the east edge of Town, south of Highway 3. It serves as the final storage facility for the majority of the Town of Coaldale south of Highway 3 and north of the Coaldale Lateral and Drain.

The proposed alignment for this relief drain would cross Highway 3 north of the pond and travel north along 8th Street. It would then travel west along 14th Avenue to 13th Street where it would be within the Cheese Factory Drain half a block to the south before connecting to the main storage facility at the Birds of Prey Centre.

Option H: Retrofit existing pump station at the Main East Storm Pond instead of constructing a new pump station (dependent upon capacity of the existing pump station)

Option I: Integrate the existing industrial park storm ponds into the system by connecting them to the force main

Figure 11 Main East Storm Pond within the Town of Coaldale, May 5, 2011

6.5.3 South Coaldale Connection

The South Coaldale Lateral is an elevated canal which runs along the south edge of the Town of Coaldale. To the north is an established residential neighborhood and to the southeast is the Town's baseball diamonds and abandoned raw water reservoirs. Immediately adjacent to the canal on the south is the South Coaldale Drain which is several meters lower than the canal. The drain captures stormwater runoff from the lands south of the Town before connecting to the main irrigation canal east of the Town.

Figure 12 South Coaldale Lateral (right), Drain (centre) and Abandoned Raw Water Reservoirs (left), May 5, 2011

During storm events, the South Coaldale Drain exceeds its capacity further downstream at the intersection of the canals at Malloy Drain and South Coaldale Drain at Malloy Lake. Though much of this pressure will be relieved by disconnecting the Town from the irrigation system, the South Coaldale Lateral also has a role to play. By relieving the pressure on the canal, further flooding downstream can be reduced.

MPE Engineering has developed a concept for the Town of Coaldale in which the raw water reservoirs can be upgraded to divert excess stormwater from the Malloy Drain and South Coaldale Drain during major storm events. After the event is over and the canals have the capacity to receive, the excess water can gradually be reintroduced to the system.

In the long term, and in order to maximize the usage of the reservoirs and provide the much needed disconnect from the irrigation system, Westhoff proposes that the water from the reservoirs be pumped to the main east

storm pond within the Town of Coaldale. This will eliminate the captured water from impacting properties downstream and provide an escape route for the water in the severe events.

Option J: Connect the lands south of the Town of Coaldale along Highway 845 to the existing South Coaldale Drain to alleviate flooding at the intersection with Highway 512. It is emphasized that this is an interim measure and for emergency situations only, and until development occurs and a proper stormwater management facility can be built. It is recognized that this option is to be further investigated and agreed upon with the SMRID and the Town of Coaldale.

6.5.3.1 Sizing of the Main Reservoir

The proposed main reservoir at the expanded Birds of Prey Centre will serve as the main stormwater storage facility for the majority of the lands in the Malloy Drainage Basin west of Coaldale and the Town of Coaldale. The region naturally tributary to the proposed regional stormwater facility was analyzed with a preliminary single event analysis using SWMHYMO (StormWater Management HYdrologic MOdel). This analysis resulted in an approximate volume of 2.2 million cubic meters.

Assuming a site footprint of 160 ha (400 acres), this volume would yield a depth of 1.4 m. In order to facilitate the additional input from the connected ponds such as the Main East Storm Pond, Coaldale Industrial Pond and the final effluent from the Coaldale Wastewater Treatment Lagoon, the final pond depth was increased to 2.0 m for a final volume of 3.2 million cubic meters.

The pond was subsequently analyzed for its historical response to precipitation based upon a release rate of 2.5 m^3/s. The Westhoff Water Balance model was customized based upon precipitation, temperature and evaporation data from 1960 to 2009 inclusive. Preliminary analysis resulted in the following performance of the storage facility:

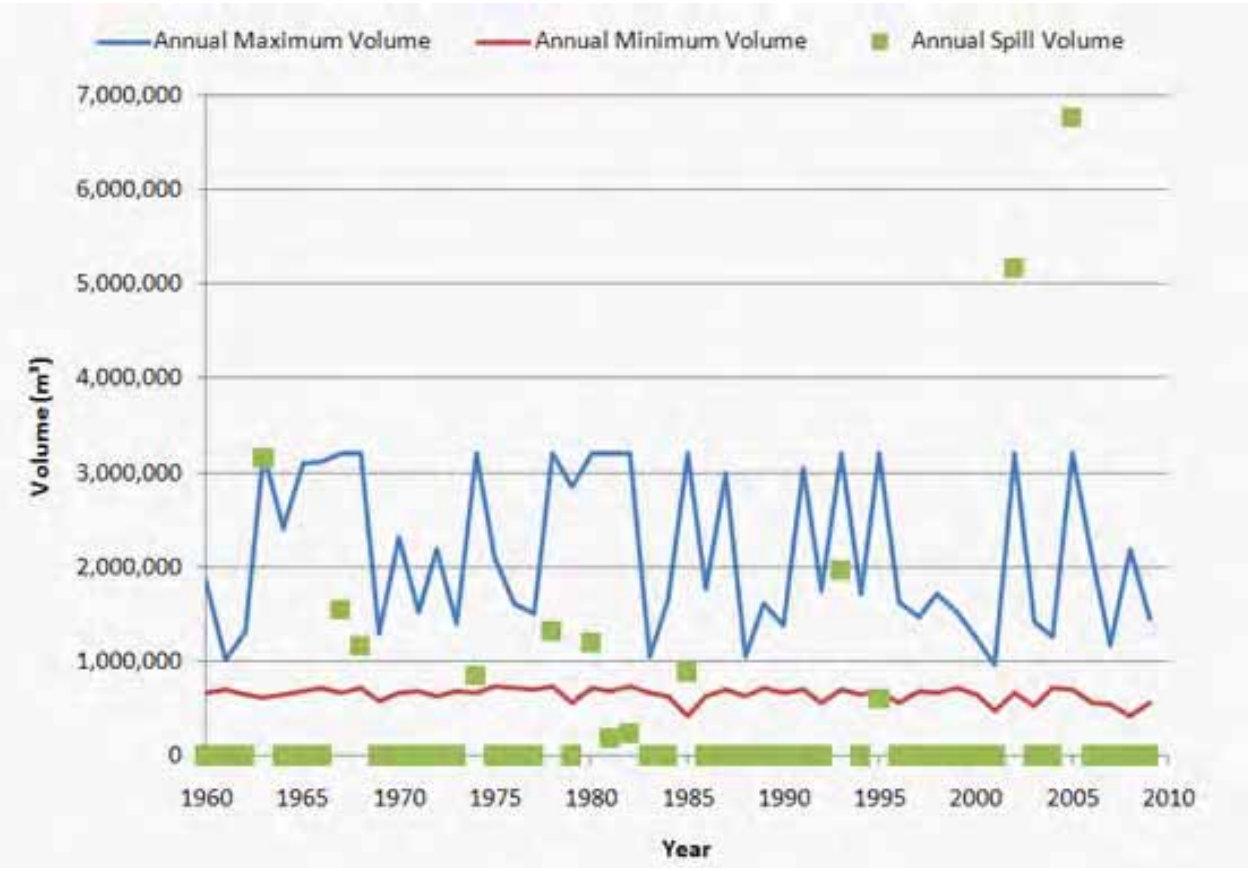


Figure 13 Preliminary Analysis Results

To enhance the storage facility's ability to attenuate severe storm events, Westhoff has developed an algorithm which allows the model to pump volumes of water in advance of storm events. The system will, based upon the weather forecast for the subsequent three days, pump water from the pond to provide extra storage capacity.

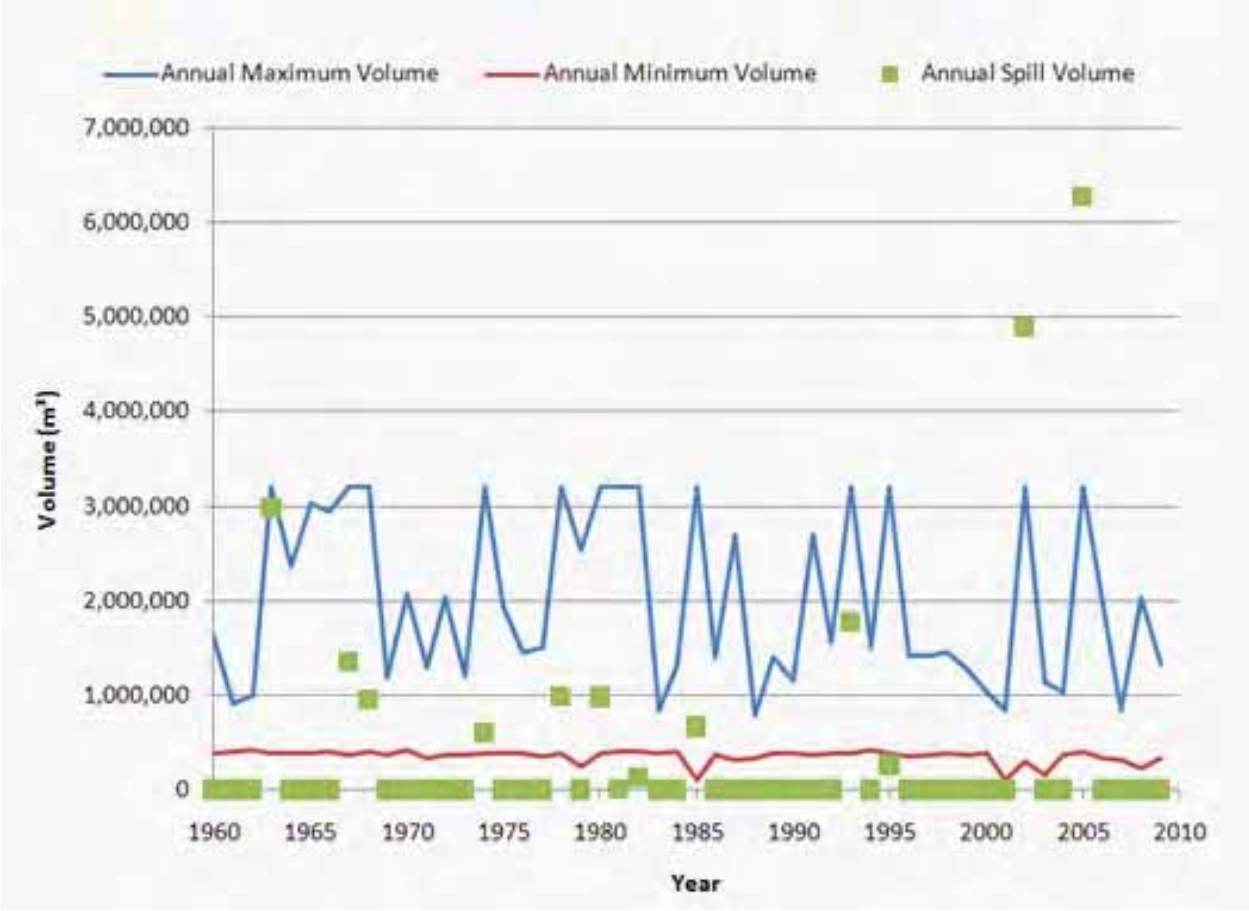


Figure 14 Preliminary Analysis Results with Predictive Pumping

Predictive pumping allows the system to better optimize its storage capacity for the region. This enables the system to respond actively during both severe storm events and drought conditions.

It is noted that the model does not take into account any time delays as the stormwater travels through the system, nor does it account for volumes of water available in existing constructed storage facilities or natural depression areas. These will naturally attenuate the stormwater, allowing the pumps to evacuate additional water from the main facility.

6.6 Integrated Water Management Plan

Water, stormwater and wastewater systems are the critical components of the water cycle. Traditionally, these hydrological components have been considered on an individual basis; however it is understood that greater opportunities exist by integrating the aforementioned systems and planning them in concert. This represents a significant shift in the way water, water infrastructure and related environmental resources are considered in the planning and design of new developments. The Integrated Development Study foresees an Integrated Water Management System (IWMS) where the net benefit is greater than the sum of its parts; ultimately leading to superior water demand management that minimizes stress on the water supply and protects the ecological integrity of the aquatic and riparian habitats.

The IWMS promotes minimizing the stress on the water supply by creating opportunities to reduce potable water demand.

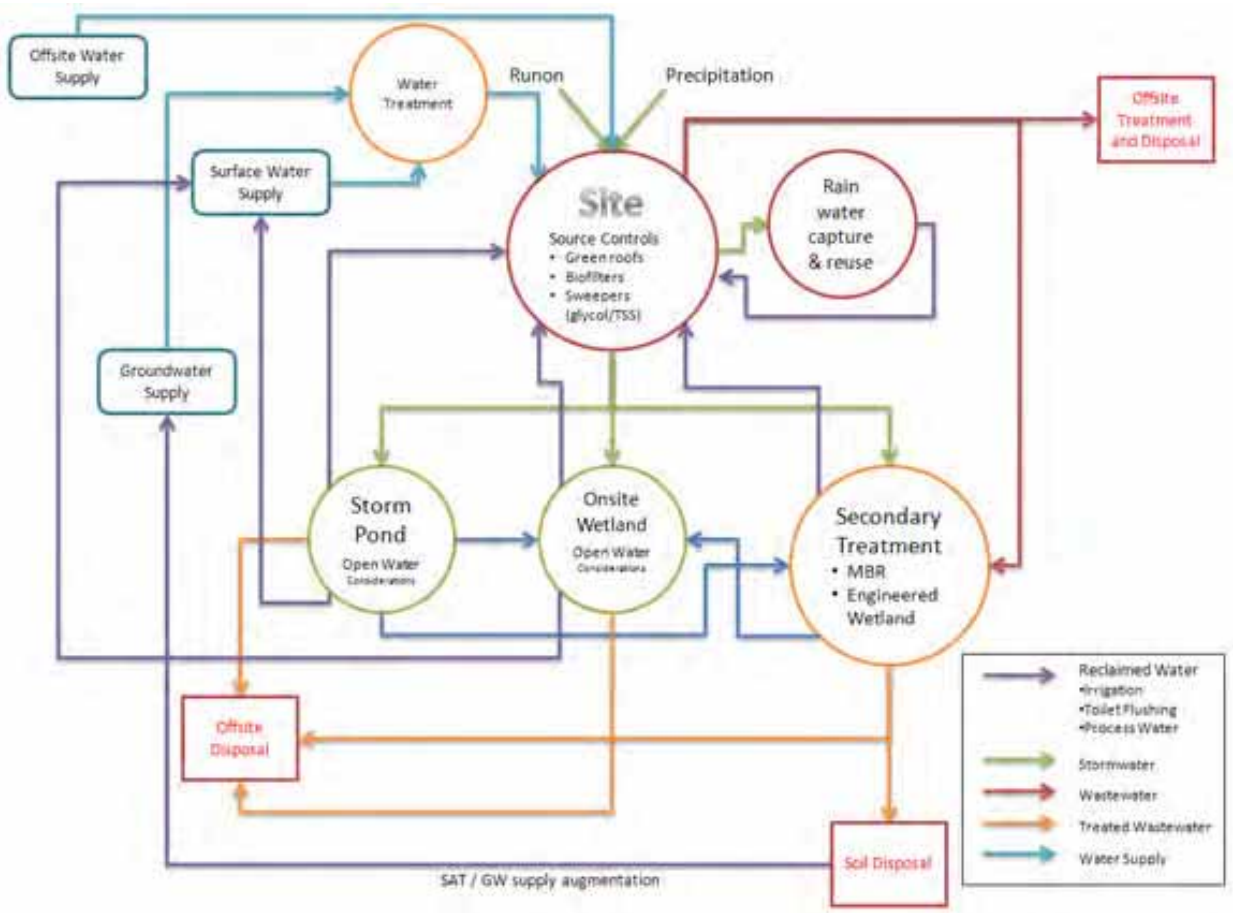


Figure 15 Potential Inter-Cycle Demand Management Opportunities

The above figure illustrated a process flow diagram of potential inter-cycle demand management opportunities. This schematic also provides insight as to how the continuous event water balance model may be structured for optimizing supply and demand for water.

Innovative supply and demand management is greatly important to the Malloy Drainage Basin area where potable water supplied by the City of Lethbridge is restricted from being used for industrial uses. IWMS strives to reduce, redirect, avoid or optimize the demand for water where unmanaged demand would exceed environment limits and cause degradation of natural resources.

These IWMS initiatives will help meet Alberta's *Water for Life Strategy*, which commits the province to improving the overall efficiency and productivity of water use by 30 per cent from 2005 levels by 2015.

6.7 Future Development

6.7.1 Future Development on the South Edge of the Town of Coaldale

The Town of Coaldale is ideally located to capitalize on its proximity to the CANAMEX Corridor, the City of Lethbridge and the abundant agricultural lands surrounding it. In order to prepare for the impacts of growth which will act upon the Town, it needs to consider the impact of increased residential, commercial and industrial land uses on its already strained stormwater infrastructure.

As presented in Section 4, Placemakers Inc. has explored with the Town of Coaldale where future development is most likely to occur as the population expands. To summarize, the northeast quadrant of the Town is prepared for future industrial growth and the northwest quadrant will be predominantly kept natural by the presence of the expanded Birds of Prey wetlands and stormwater reservoir. Residential development north of Highway 3 is undesirable due to the presence of the railway tracks which are on the north side of the highway. Residential development

is occurring and best suited to the areas of Town south of Highway 3. Please see the report from Placemakers for additional detailed information.

The main impact of growth in the Town of Coaldale which will have an effect on stormwater management is future residential growth on the south edge of the Town of Coaldale. To minimize this impact, Low Impact Development (LID) measures are strongly recommended for all residential developments.

6.7.2 The Importance of Low Impact Development

Traditional methods of stormwater management include wet ponds, dry ponds, wetlands and underground pipe networks to convey stormwater away from developed areas. While these methods serve to provide sufficient sediment removal as per current guidelines, they do little to remove the finer sediments and nutrients. LID consists of a set of best management practices (BMP's) which seek to reduce stormwater quantity and improve stormwater quality at its source. These practices include but are not limited to:

- Green roofs;
- Bioretention areas (e.g. rain harvesting system as implemented at the University of Lethbridge for toilet flushing, laboratory usage and irrigation);
- Porous Pavement;
- Water Re-use; and
- Bioswales.

LID measures such as those above can be implemented by the Town on new projects or renovations to its existing buildings, developers and individual land owners. These measures can be mandatory and added to existing bylaws for land development. For example, the City of Calgary has mandated that all of its new buildings for City employees must meet or exceed the silver rating for Leadership in Energy and Environmental Design or LEED®. LEED is an independent certification process which promotes the design and construction of environmentally sustainable buildings. Similar programs exist for residential developments, such as the Built Green™ program and others.

Figure 16 Green Roof on the Ducks Unlimited Headquarters in Winnipeg, Manitoba

The following approaches shall be explored to reduce demand on the potable water supply.

- Low flow fixtures will be standard in future industrial, commercial and residential developments. These fixtures, such as dual flush toilets, low flow showers, appliances and faucets can reduce potable water demand by at least 31% when compared to a baseline demand case.
- Harvested rain water from rooftops may be used to flush toilets, clean laundry, wash vehicles and irrigate the surrounding private green space.
- As part of a sustainable neighbourhood design, landscaping may utilize native vegetation wherever possible to

reduce the irrigation demand (xeriscaping). Irrigation of public areas with reclaimed water and stormwater from centralized storm ponds is an option to further reduce potable water demands.

- In addition to irrigation, reclaimed water may be used for toilet flushing in both private and public areas where capital infrastructure costs deem it viable to do so.

6.7.3 Future Development at the Canamex and Highway 3 Interchange

Highway corridors are attractive areas for commercial and industrial developments and recent years have shown an increase in this market sector. The CANAMEX will be no exception to this and albeit the semi-arid characteristics of the study region within a closed basin most unique opportunities are created through embracing integrated water management strategies showcasing good management of a precious resource, water.

To demonstrate such opportunities, an example is presented using the existing development; Broxburn.

6.7.4 Water Re-Use Example at Broxburn Business Park

Broxburn Business (BB) Park is an industrial/commercial business park located on the southwest corner of the future Highway 3 and Canamex Highway Interchange. The stormwater management pond, roads, electrical supply and fire suppression pond have all been constructed, however, several obstacles remain before development may be allowed to proceed. The site is a prime candidate to showcase the reuse of stormwater in an industrial/commercial setting. Stormwater management is the major concern.

Figure 17 Stormwater Management Pond at Broxburn Business Park (May 5, 2011)

Westhoff analyzed the Broxburn site using our customized Water Balance Model. The Water Balance Model is an enhancement of the QUALHYMO continuous simulation analysis, upgraded to reflect the variation in runoff conditions between cold weather and warm weather periods. The model incorporates precipitation (i.e. rain and snow) and determines the effective runoff resulting from the proposed land use (i.e. commercial in this case). It simulates the quantities of water collected by the pond, its losses and consumptive uses such as irrigation as required by the user. In this case, irrigation demand is simulated for the summer months between May 1st and September 30th at a rate of one inch per week. The model is applied for the years 1960-2009, inclusive, based upon recorded precipitation and temperature data recorded at the Lethbridge Airport.

The water balance analysis was conducted for three scenarios;

1. Runoff captured by the storage pond is used for irrigation of green space only;
2. Same as 1, plus continuous water supply to water users in the BB Park; and,
3. Same as 2, plus water shortage is provided by diversion from Birds of Prey facility.

The results of the analysis are shown below and various illustrations related to LID and BMPs are presented in the exhibit following this page.

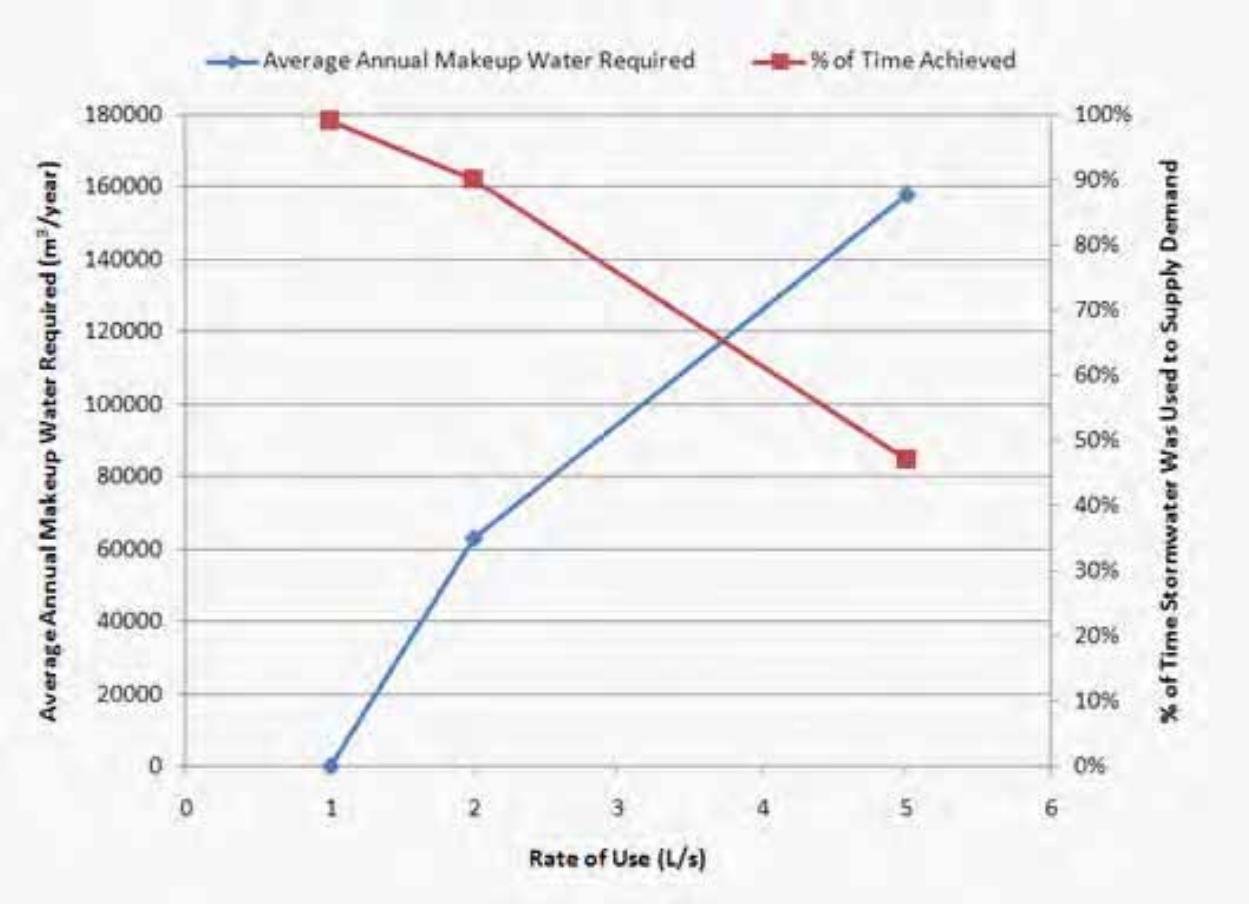


Figure 18 Preliminary Water Reuse Results for Broxburn Business Park

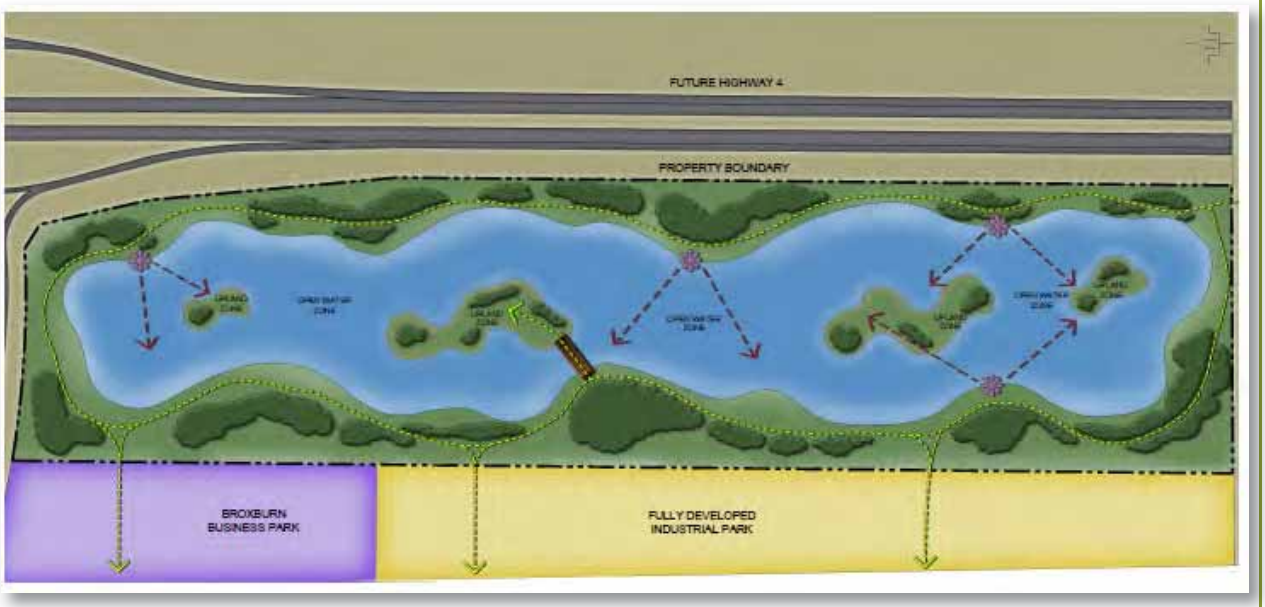
The above graphic illustrates that for low rates of industrial water usage, stormwater can supply almost 100% of all water requirements. As the rates of usage increase, stormwater volumes will be insufficient for supply and an additional source of water (make-up water) will be required. One option for supply would be the main reservoir at the expanded Birds of Prey wetlands.

It is emphasized that stormwater can be treated to potable quality or be of lesser quality for industrial uses. This aspect of capture, treatment, and reuse is already implemented in various developments in the Calgary region, including, but not limited to[2] [1]:

- Wesco warehouse site with zero release and use of stormwater as water supply for refrigeration system;
- High Plains Industrial Park, a 1000 acre self sustaining industrial/commercial development situated in self contained drainage basin will have its own water system that includes stormwater capture, treat and reuse.
- Frontier Industrial Park with zero release rate policies where on-site (each lot) water balancing is achieved by irrigation and enhanced evaporation; and,
- Nose Creek Industrial Park with volume control and release rate policy in compliance with the Nose Creek Watershed Water Management Plan.

1 These efforts were successfully implemented with consultation of Alberta Environment and local jurisdiction and supported with detailed analysis and project description documents indicating that runoff still reaches the receiving streams, but that a "longer route" is taken. Alberta Environment has facilitated these projects on a case by case basis.

[2] Integrated water management sites as designed by Westhoff Engineering Resources, Inc.



Proposed landscaping plan for the water-reuse pond which will serve future development at the intersection of Highway 3 and the CANAMEX Highway.

6.7.5 Stormwater Management at CANAMEX Highway Interchanges

An example of an integrated management system for stormwater at highway interchanges is illustrated in the photograph below.

Figure 19 The Interchange of Beddington Trail and Country Hills Boulevard NW, Calgary (2010)

[3] Integrated stormwater management as designed by Westhoff Engineering Resources, Inc.

The stormwater management system components integrated at the interchange include:

- Trap lows at turning ramps;
- Storage within loop systems;
- Multi-cell constructed wetlands to address water quality and quantity; and,
- Oil & grit separator in-line of outlet system and prior to outfall at West Nose Creek

6.8 Water Shortage Response Plan

Managing runoff from the study area and recognizing the sheer size of this region and given the proposed large expansion of the Birds of Prey brings enormous opportunities, if planned and executed right. However, to harvest these opportunities, an operable and dynamic system is to be implemented. For the IDS study area the following notations are made:

Ultimate storage capacity of the expanded facilities at the Birds of Prey is in the order of three million cubic meters. In addition, diversion of excess runoff and storage at the SMRID North East Reservoir can add to significant water quantities that may be reserved for dry spells. The availability of this water is made possible if the proposed drainage system described in the aforementioned sections is equipped with pump systems at all discharge points. Recognizing the fact that all force mains will be following a flat profile if not horizontal, water could be returned via the force main system linking all storage nodes. All these nodes could be a reservoir for localized needs of water including but not limited to:

- Irrigation of green spaces;
- Irrigated agriculture;
- Alternative supply for industrial water, etc.

It is recognized that the cost of the pump stations for a “return flow” system are not inexpensive. However, the development planning and execution shall include strategic measures to attract high water users for this region.

The unknown variables of the end user water needs and the importance to such entity for which water is crucial to the business or operation (e.g., specialty crop, industrial user with high water demand) is to be established. The example of the Broxburn Business Park (scenario 3) is already a good model to follow as these types of developments occur and are encouraged along the CANAMEX corridor.

6.9 Cost Projections and Funding Opportunities

Below is the preliminary order-of-magnitude cost estimate for the Regional Storm Water Management System:

Table 4 Cost Estimate for the Regional Storm Water Management System

Cost Item			Unit	Quantity	Unit Cost	Cost
Force Main to Oldman River						
	1200 mm Diameter Force Main		m	13600	1,084	14,472,400
	River Outfall Structure		ea	1	785,000	785,000
	Canal Crossings		ea	4	25,000	100,000
	Connection to the SMRID North East Reservoir		ea	1	-	-
Birds of Prey Reservoir and Pump Station						
	Pumps (4x470 hp), Vault and Controls		ea	1	2,500,000	2,500,000
	Excavation of Reservoir		m^3	3,200,000	3.4	10,880,000
Abandoned Raw Water Reservoir Storage Facility						
	South Coaldale Lateral Connection					
		Pump Station Upgrade	ea	1	650,000	650,000
		SMRID Lateral Diversion Structure	ea	1	350,000	350,000
		Inter-cell Transfer Structure	ea	1	165,000	165,000
	Main East Storm Pond Connection					
		Pump, Vault and Controls	ea	1	500,000	500,000
		Force Main	m	1900	605	1,419,500
Main East Storm Pond Upgrades						
	Upgrades to Pump #1		ea	1	400,000	400,000
	Force Main		m	2500	605	1,512,500
	Highway 3 and CPR Railway Tracks Crossing		m	115	1000	115,000
	Highway 845 Crossing		m	40	1000	40,000
Industrial Storm Pond Connection to Force Main						
	Pump, Vault and Controls		ea	1	250,000	250,000
	Force Main		ea	130	605	78,650
Drainage Relief for west side of Town						
	Ditch Upgrades		m	2400	100	240,000
	Inlet Structure to South Coaldale Lateral		ea	2	20,000	40,000
Localized Improvements Along the Cheese Factory Drain			ea	1	100,000	100,000
Subtotal:						**34,598,050**
Contingency of 15%:						**5,189,708**
Estimated Total Cost:						**39,787,758**

It is noted that the above cost estimate is order-of-magnitude in scope and that costs for landscaping, pathways or other aesthetic improvements to either the main storage reservoir or the abandoned raw water reservoirs were not included. These costs are to benefit the entire region (21,662 ha or approximately 53,530 acres), not just the land which will be developed. This strategy will enhance the long-term prosperity of the agricultural lands by mitigating current challenges during wet years with waterlogged soils not allowing germination of seeds or the maturing of crops. In this manner, it also opens up a variety of funding opportunities above and beyond government grants (e.g., reduced insurance premiums) and off-site levies.

The subsequent table illustrates the estimated costs for future development in the four quarter sections south of the Town of Coaldale and the supply of water from the reservoir to Broxburn Business Park.

Table 5 Cost Estimate for Future Development Nodes

Cost Item			Unit	Quantity	Unit Cost	Cost
Storm Water Reuse Opportunities						
	Pump Station		ea	1	250,000	250,000
	Forcemain to CANAMEX/Broxburn Development Node					
		Total Length	m	6300	605	3,811,500
		Railway & Highway Crossing	ea	1	115,000	115,000
Residential Development Nodes						
	Stormwater Pond at Each Development Node		ea	4	750,000	3,000,000
	Force Main					
		Total Length	m	3250	605	1,966,250
		Pump Station	ea	1	250,000	250,000
Residential Development Node in NE 9-9-20-W4M						
	Stormwater Pond		ea	1	750,000	750,000
	Force Main					
		Total Length	m	400	605	242,000
		Pump Station	ea	1	250,000	250,000
Subtotal:						**10,634,750**
Contingency of 15%:						**1,595,213**
Estimated Total Cost:						**12,229,963**

Assumptions:	
Road Crossings	25 m
Canal Crossings	25 m
Cost	1000 lin meter
Highway 3 & Railway Crossing	115 m ROW
Highway 845 Crossing	40 m ROW
	MPE Pricing Extrapolation
	Input Required

It is anticipated that much of the above costs will be borne by future developers.

The funding opportunities for capital improvements may be generated from:

- Federal and/or provincial grants
- Development levies
- Taxes from new developments
- Debentures
- Creation of a water utility which will be able to:
    - treat stormwater and sell it
    - treat wastewater and sell it

6.10 Recommendations

- Lands for the expansion of the Birds of Prey or frequent inundated areas are acquired to secure location for storage of runoff
- Forcemain alignments noted in the report are confirmed and protected by easements
- Funding strategies are initiated simultaneous with implementation studies
- Broxburn Business Park is allowed to proceed with integrated water management system to demonstrate locally that self sustaining developments for industrial parks can be made possible
- Local standards for the County of Lethbridge and Town of Coaldale be amended to encourage and allow storm-water harvesting and reuse, noting that current legislation may not be comprehensively supportive of these initiatives
- Continue communications with Alberta Transportation related to force main alignments crossing/running parallel with existing and future transportation networks
- Runoff at future interchanges and intersections at major traffic roadways be integrated with potential nearby highway commercial developments
- The Town of Coaldale and County of Lethbridge form an inter-municipal drainage committee that safeguards the collaborative nature and intent of the proposed regional management of stormwater for the IDS study area.

6.11 Phasing Strategy

The Birds of Prey expansion and force main to the Oldman River are primary elements for addressing regional flooding issues. However, it is recognized that even these works may be phased. That is, building the expansion could be phased with leaving the Cheese Factory Drain operational in the near term and until the pump station and force main can be built. It is anticipated that alignment agreements, utility easements and crossing agreements for the force main will consume time to get in place while some of the expansion efforts at the Birds of Prey are already being planned for.

Subsequently, the most urgent frequently flooded areas are to be programmed for drainage relief works and tie-in to the Birds of Prey expansion. This includes frequently flooded areas in the County of Lethbridge as well as the tie-in of infrastructure upgrades to relief drainage issues in the Town of Coaldale. Priority ranking shall take into consideration risk of flooding, damage to private and public property, nuisance and economic impacts.

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Appendix D

Stormwater Summary Report

Existing Conditions In the Region (Drawing SWM01)

Existing Conditions in the Town of Coaldale (Drawing SWM02)

Proposed Regional Stormwater Management System (Drawing SWM03)

Proposed Stormwater Management System at the Town of Coaldale (SWM04)

Profile of the Proposed Force Main to the Oldman River

7.0 WATER SUPPLY AND WASTEWATER TREATMENT

7.1 INTRODUCTION

This section of the report involves the design of an Integrated Water Management Strategy for the water supply, wastewater treatment and effluent management systems for all future residential, commercial, and industrial growth within the Town of Coaldale and the County of Lethbridge. This includes identification of an alternative raw water supply for commercial and industrial users within the County of Lethbridge as this group of users is presently not provided with water from the City of Lethbridge's water supply. This alternative raw water supply could be obtained from a number of sources including rainwater harvesting, stormwater storage ponds and groundwater supplies created by recharging aquifers with stormwater or high quality treated effluents.

It is suggested that aggressive water conservation practices be implemented for all future residential, commercial, and industrial growth in the study area. Emphasis should be placed on reducing demand on potable water supplies and industrial water supplies. This can be accomplished by requiring consumers to use smart water meters, low flow fixtures, point of use water heaters and low consumption appliances. Water reuse should also be encouraged and this can be accomplished by requesting consumers to collect and treat grey water for toilet flushing and other utility service functions.

Wastewater treatment and disposal is a key issue when contemplating land development projects. In the past, the accepted approach was the construction of an extensive sewage collection system and a centralized wastewater treatment plant with a design period of 20-30 years. There is a realization that a network of decentralized treatment plants constructed on a just-in-time basis as modular treatment units, is a more appropriate and cost effective solution for new land development initiatives. It is assumed that the proposed aggressive water conservation program will reduce water consumption by at least 50% and thus the quantity of wastewater to be treated by at least 50%. Wastewater treatment process configurations should be selected which have the capability of creating a product achieving drinking water quality standards and thus, effluent disposal will be replaced by product reuse or recycle criteria. As a result, wastewater management will become an integral component of the Integrated Water Management Strategy developed to manage stormwater, water supply and wastewater recovery and reuse for the Integrated Development Strategy.

It should be acknowledged that the technology for water and wastewater treatment is not considered to be an issue; however the design and approval of the disposal/reuse system is new to Alberta Environment and approval of this alternative disposal option will be a challenge.

7.2 WATER SUPPLY

7.2.1 WATER SOURCES

The majority of the water supply for residential users in the study area is presently being provided by the City of Lethbridge. This potable water supply is distributed by the Lethbridge Regional Water Services Commission (LRWSC) to the Town of Coaldale and the County of Lethbridge Rural Water Users Association (CLRWUA). The allocation for each of the user groups is presented in Table 7.1; the estimated actual consumption in 2010 for each of the user groups is also present in this table. The supply from the City of Lethbridge includes the supply of up to 7,600 m^3/d of water for the McCain's food processing plant located approximately 10 km to the east of the Town of Coaldale on the north side of Highway # 3.

It is assumed that the supply and delivery of potable water to the Town of Coaldale as well as residential units having access to the County of Lethbridge Rural Water Users Association will continue in the future. It is also assumed that the water supply for industries and commercial facilities within the Town of Coaldale will continue to be supplied by the Town of Coaldale; however, water supply from the City of Lethbridge for industrial and commercial users within the County of Lethbridge must be approved on a case by case basis. McCain's is an example of an industrial user that has negotiated a contract with the City of Lethbridge for the supply of potable water for their

industrial processing. Since it is not feasible to rely on the City of Lethbridge for the supply of water for industrial or commercial facilities within the County, it is proposed that the water supply and water for fire protection for industries and commercial facilities within the County be supplied from existing or newly constructed stormwater retention ponds.

TABLE 7.1: Water Allocation

From	To	Allocation (m^3/day)	Estimated Actual Total Use in 2011 (m^3/day)
City of Lethbridge	**LRWSC**	**18,500**	**7,500**
LRWSC	**Town of Coaldale**	9,990	2,300
	County of Lethbridge	8,510	5,200
	Total	**18,500**	**7,500**
County of Lethbridge	**McCain Foods**	7,600	4,500
	CLRWUA	910	700
	Total	**8,510**	**5,200**

For Broxburn Industrial Park, located on the south side of Highway # 3 between the City of Lethbridge and the Town of Coaldale, the stormwater pond and the infrastructure for fire protection have already been installed. Water to be supplied from the stormwater pond for the industrial users will have to be treated to the quality required by the specific industrial clients. The technology exists today to provide the treated water on a just-in-time basis rather than constructing a water treatment plant which will provide potable water for all future industrial clients. As an alternative, by establishing guidelines for the client base entering the industrial park, it will be possible to provide a water treatment plant providing water of a quality which satisfies the basic needs of a wide range of clients. The water quality can be upgraded at the specific plants to satisfy the local water quality demands of individual clients.

Infrastructure similar to that provided by Broxburn Industrial Park will have to be installed for other industrial and commercial users in the County. It is proposed that the industrial water supply for industrial process water and fire protection be taken from the network of stormwater retention ponds with treatment of the water to the quality required by the individual users. It should be assumed that the capital and operating costs for the stormwater storage ponds, the water treatment plant(s), the fire protection system and the wastewater treatment and effluent disposal system will be paid by the owner of the industrial park.

It should be acknowledged that the Saint Mary River Irrigation District (SMRID) will enter into an agreement to sell irrigation water to the industrial and commercial users. However, the Integrated Water Management Strategy, proposed in this study, will ensure that there will be an adequate raw water supply from the stormwater retention ponds even during extended drought periods. Excess water from the holding ponds in each of the industrial parks will be pumped to the major holding/storage area located within the expanded Birds of Prey facility. If there is a requirement for water during an extended dry period, water can be pumped back from the major holding/storage area into the holding pond(s) at the industrial park. This water supply will be of a quality similar to SMRID's irrigation water and thus, both sources require treatment prior to being used by the commercial and industrial clients.

7.2.2 WATER CONSERVATION

Water conservation is a very important aspect of the Integrated Water Management Strategy in order to be certain that there is sufficient water for future generations. One of the main objectives should be to utilize as many water saving techniques and technologies as technically and environmentally feasible. An aggressive water conservation strategy should be an integral component of all future growth in the Town of Coaldale and the County of Lethbridge. If all or even some water conservation methods are embraced by the current water users and the future residential, commercial and industrial developments, there will be sufficient water for all future development.

Using water saving techniques, the current water consumption could be reduced by as much as two thirds. The water usage in the Town of Coaldale is currently approximately 300 litres per capita day (lpcd). An investigation conducted by the study team used a water use calculator to determine that with aggressive water conservation, consumption for residential units can be lowered to an estimated 100 lpcd or 80 lpcd if greywater reuse is utilized.

Numerous Canadian and International websites were accessed and a water use calculator was located which was

capable of predicting water consumption for an aggressive water conservation program. A study conducted by the City of Calgary provided the important data base which was used to calibrate the water calculator. This information was supplemented by accessing data bases from appliance owner manuals. The water use calculator estimated the water usage by taking into account usage from the average shower time, the number of toilet flushes per day, the length of time that each person runs the faucet, the number of dishwasher runs per week, the number of times per week washing machines are used, and the number of times dishes are done by hand. This important information was provided from the study sponsored by the City of Calgary.

The following information was used as inputs to the water use calculator.

- The average shower length was 5.3 minutes per person per day. By using water efficient aerated shower heads the water flow rate can be lowered to 3.79 litres per minute and thus, the average person should be able to reduce average usage in showers to 20.1 lpcd.
- The average person flushes the toilet 5.1 times per day. By using an ultra-low flush toilet the water used per flush can be reduced to 3.79 litres. Therefore, the water use from the toilet was estimated to be 19.3 lpcd.
- The average person runs the faucet for 8.1 minutes per day. Using an efficient faucet aerator the water flow rate can be reduced to 1.89 litres per minute. By using this technology the water use due to running the faucet can be reduced to 15.3 lpcd.
- The average person does 0.37 washes per day and by using new water efficient front load washers, the water used per wash can be reduced to less than 75.71 litres per wash. Therefore, the water usage can be reduced to less than 28.0 lpcd.
- Water usage from washing dishes was more complicated because people use dishwashers and also wash dishes by hand. The average person does 0.353 loads of dishes per person per day and by using an eco-friendly dishwasher uses no more than 17.8 litres of water per wash on a normal wash, the water consumption from the dishwasher can be minimized to 6.3 lpcd. To estimate the water used for washing dishes by hand, many assumptions were made; however, the water used can be approximated at 9.1 lpcd. Combining the two values for washing dishes, the total water consumption is 15.4 lpcd.

Table 7.2 Water Usage Table

Type of Use	Flow Rate/Water used per cycle	Length/Number of uses per person per day	Total Water Use (lpcd)		
			With Conservation	With out Conservation	Water Saved
Shower	3.79 L/min	5.3 min	20.1	79.5	59.4
Toilet	3.79 L/flush	5.1 flushes	19.3	84.1	64.8
Faucet	1.89 L/min	8.1 min	15.3	101.2	85.9
Clothes Washing	75.71 L/wash	0.37 washes	28.0	62.9	34.9
Dish washer	17.79 L/wash	0.353 washes	6.3	14.1	7.8
Hand washing Dishes	23.82 L/wash	0.385 washes	9.1	9.1	-
Total			**98.1**	**350.9**	**252.8**

When the water consumption is reduced to 98 lpcd there will be a corresponding reduction in the volume of wastewater generated. At these low flows, special attention must be paid to the design and installation of the sewer line from the building to the main sewer. These connecting sewer lines are typically 200 mm at a grade of 0.5 %; however, this grade may not be adequate as there may not be sufficient flow velocity for the conveyance of the solids through this line. Prior to installing the connecting sewers at these low flows, the grade specifications for similar installations need to be checked.

The 98 lpcd does not include any water use outside of the house for watering grass and gardens. It is proposed that for all new subdivisions within the Town of Coaldale, a separate utility water supply be provided for watering lawns and gardens. To make this happen there must be a separate distribution system or a purple pipe system supplied from one of the storm water ponds that will provide untreated stormwater to be used only for outdoor watering. With the decrease in water consumption from approximately 300 lpcd to 100 lpcd for all new subdivisions, the Town of Coaldale's existing water supply allocation of 9,990 m^3/d from the City of Lethbridge should be adequate for the next 50 years. This approach to water conservation will also directly decrease the amount of wastewater generated per capita per day and thus have a positive impact on the future design capacity of the

wastewater treatment plant.

7.2.3 COUNTY OF LETHBRIDGE WATER SUPPLY

7.2.3.1 RESIDENTIAL

Residents that are living in the rural areas of the County have two options for receiving water supply. They can either purchase a share and pay the initial setup fee to the County of Lethbridge Rural Water Users Association for a water line extension to their property plus the monthly water consumption cost or they will have to drill their own well. Both are viable options; however, if the new house is not relatively close to the existing distribution system, then the cost of the connection may be prohibitive. It will be up to the owner to decide on which of the options are selected. Because of the uncertainty and cost associated with the drilling of a well on private property, this may also be an expensive alternative.

7.2.3.2 INDUSTRIAL

It is proposed that all new industries in the County of Lethbridge be located in industrial parks having their own water supply and wastewater treatment facilities. The raw water supply should come from a stormwater pond with the supply linked to the Integrated Water Management Strategy major water storage facility.

The use of a stormwater pond or ponds which can be filled by or drained to a major stormwater holding area will guarantee the water supply for industrial use and fire protection. The stormwater pond will also provide the stormwater management infrastructure for the industrial park. The initial planning process for the industrial park developer will be difficult as the industrial park tenants could potentially have a wide range of water demands for their processing requirements. Neither the developer nor the utility service provider can predict the water demand and water quality required for the industrial park until the client base has been identified. Thus, the process configuration and capacity of the treatment process cannot be determined until all of the industrial clients have been identified.

Normally a study would be undertaken to assess the industrial park location to determine if there would be sufficient water produced by runoff to fill the stormwater ponds and determine the pond size needed to supply the long term water demand. This study would have to take into account the area of the industrial park, the number of commercial clients, and each client's water needs. The developer would have to research all of these aspects for each of their clients prior to construction of a stormwater ponds and treatment facility. Since the developer and the utility service provider should provide all industrial clients with water to meet specific quality and quantity requirements, it will be difficult to provide the supply and treatment design before the industrial park clients are known.

The use of a smaller storage pond linked to the Integrated Water Management Strategy major water storage facility will eliminate the uncertainty during the design phase and to the extent possible, the water treatment can be provided on a just-in-time service delivery. This will require the developer and the utility service provider to pay for and construct an onsite water treatment plant providing water of the predetermined quality. The process treatment train could be as follows:

- Dual Screened Intakes from the bottom of the stormwater pond – to be equipped with a back wash system for screen cleaning.
- Stilling Well – equipped with pumping station from the pond to the treatment plant.
- Mechanical Screen – equipped with a self cleaning device.
- Dissolved Air Flotation – with chemical addition as required.
- Powder Activated Carbon addition – to remove any trace organics and any taste or odour.
- Dual Media Filtration
- Chlorination – adding the chlorine into a holding tank with baffling to allow for sufficient contact time before being pumped to the units.
- Pumps – pumping of treated drinking water to commercial units.

This is an example of the processes that may be needed to achieve the industrial process water quality from the stormwater pond. The water quality requirements will have to be assessed on a site by site basis as the industrial clients are secured. Initially, on site treatment modules may be required to enhance the treated water quality if a specific industrial client requires high purity water or water supply having unique water characteristics.

If drinking water is not needed for process water then the outlined treatment processes may attain the water quality that would be sufficient for the commercial clients. If the clients require drinking water only for staff use, they could install individual treatment units such as a small reverse osmosis unit on each or several of the drinking water faucets. As an alternative, they could have bottled water supplied to the site.

The developer will also have to provide a fire protection system for the industrial park. The water that would be needed for such a system could come from the stormwater pond. It could be pumped from the pond through an intake pipe and mechanical screen, with an automatic backwash system, with no further treatment processes because the water will not be used for human consumption. This system could also be connected to an outdoor utility water system that would only be used for landscape watering (i.e., not for human consumption). By connecting the fire protection and utility water systems together, there is a significant capital and operating cost reduction for the water supply and treatment systems with both the developer and ultimately the industrial clients benefiting.

Reference has been made to a utility services provider and this requirement needs to be clarified. It is almost certain that neither the land developer nor the industrial tenants will be qualified to operate the water supply, water treatment and the wastewater treatment systems for the individual industrial parks. As a result, it is recommended that for each of the industrial parks, the industrial park owner should retain a utility services provider to design, construct and enter into a long term operations agreement, preferably 20-years, to ensure that all essential services are provided. The preferred procurement model would be a design-build-finance-operate model which transfers all responsibilities to the utility services provider including a portion of the financing for the development of the industrial park.

7.2.4 TOWN OF COALDALE WATER SUPPLY

Currently potable water for the Town of Coaldale is supplied directly by the City of Lethbridge. The existing water delivery system from the City of Lethbridge is a 500 mm line delivering water at a pressure of 869 kPa (126 psi). A pressure reducing valve drops the pressure to 393 kPa and the water is delivered directly through the Town's distribution system. Storage is available, and is an essential component of the water distribution system to ensure continued water delivery in the event of disruption of service from the City of Lethbridge or failure of the pipeline from Lethbridge. The existing Town's chlorination system is not compatible with the City of Lethbridge's chlorination system; however, there is always a chlorine residual in the water supply delivered to the Town and thus, there is presently no requirement for additional chlorine addition.

Although a detailed analysis was not conducted as part of this investigation, previous studies have reported that at the present water usage, the core infrastructure of the Town of Coaldale's existing water delivery system would support a population of approximately 12,000. At the current consumption rate of approximately 300 lpcd, it was reported that this supply will provide enough water to the Town of Coaldale for approximately 20 years. Population projections for Coaldale by 2031 are estimated between 10,134 (yearly two percent growth rate) and 16,467 (yearly four percent growth rate). Therefore, at a four percent growth rate the water supply will be more than enough provided that the suggested water conservation techniques and technologies are implemented and enforced. Since the average annual growth in the last 50 years was 1.9% (2006 calculation) it is unlikely that there will be a growth rate of 4% for an extended period of time in the near future.

Water consumption by future industrial clients has not been factored into these estimates as it is difficult to predict without knowing the type of industry and thus the water consumption. As long as the consumption rates for the new industries are low, which is typical of the present industrial consumers within the Town, then the present water supply from the City of Lethbridge will be adequate. If a food processing plant similar to the McCain Foods plant with a high water demand was to locate within the Town's boundaries then the water supply and the wastewater treatment requirements would have to be reassessed. For those industries requiring only utility grade water supplies, provisions could be made to supply water from the Integrated Water Management Strategy major water storage facility, which could have a significant impact on the total volume of water consumed from the Town's potable water supply system.

7.2.5 SUMMARY

With aggressive water conservation for all new residential, commercial, and industrial growth, the Town of Coaldale's water supply from the City of Lethbridge should be adequate for in excess of 20-years even if the Town's annual growth rate was 4%. The introduction of a water conservation strategy for all existing residential units could further reduce the water consumption and thus, extend the life of the existing infrastructure.

For the County of Lethbridge it is anticipated that the majority of the residential water demand will be supplied by the City of Lethbridge from the County of Lethbridge Rural Water User's Association's existing infrastructure. The remaining residential water supply will have to be provided from wells located on the individual properties. It is recommended that the industrial growth within the County of Lethbridge be restricted to industrial parks similar to the Broxburn Industrial Park. For these industrial parks the water supply should be provided from stormwater ponds on the property which could discharge excess water or receive water from the Integrated Water Management Strategy major water storage facility. The purchase of water from SMRID to maintain the required water supply and stormwater storage capacity should also be considered as an option .

7.3 WASTEWATER TREATMENT STRATEGY

7.3.1 COUNTY OF LETHBRIDGE

7.3.1.1 RESIDENTIAL

Since most rural housing is dispersed throughout the County, each residence will need to be equipped with a septic tank or mechanical treatment plant and an effluent disposal field. The design and the permit for each of these private sewage systems must follow Alberta Municipal Affairs, Private Sewage Codes and Standards - 2009. Each system must initially achieve the design requirements and be inspected by an authorized inspector. They will need ongoing assessments to ensure that the minimum requirements continue to be met.

The private sewage systems for individual homes are funded by the land owner. If there is a communal installation such as the Vista Meadows subdivision, the private sewage system is still the responsibility of the land developer and ultimately the home owners association. As a result, the County of Lethbridge has no responsibilities for the management of wastewater treatment and effluent disposal.

7.3.1.2 INDUSTRIAL

The study team suggests that each of the industrial parks established in the County of Lethbridge have their own wastewater treatment and effluent management system. The wastewater treatment plant and effluent disposal system must be planned, designed, approved, constructed and operated by the owner of the industrial park. The wastewater treatment plant must be designed to meet all of the minimum effluent standards established by Alberta Environment and the design approved by Alberta Environment prior to initiation of construction and operation.

The technology exists to provide wastewater treatment facilities that generate a product water of a quality that approaches or surpasses drinking water quality standards. The water produced by the treatment plant can be reused by industrial users within the park, disposed of in engineered wetlands, or used for aquifer recharge or aquifer storage and recovery.

Broxburn Industrial Park should be used as the example of what each of the industrial park owners must provide. With the exception of a water treatment system, and the wastewater treatment and effluent disposal/reuse system, the infrastructure for the industrial park is in place. With the stormwater pond interconnected with the Integrated Water Management Strategy's major water storage facility, the storage pond on the Broxburn property is likely larger than it would have to be. Water and wastewater treatment are not an issue; however the design and approval of the disposal/reuse system is new to Alberta Environment and approval will be a challenge.

All of the capital and the operating costs for the management of the wastewater and other wastes generated within the industrial parks will be the responsibility of the industrial park owner or their designated utility services provider. The County's responsibility with respect to water management for a network of industrial parks will be their role in the construction and management of the Integrated Water Management Strategy's major water storage

facility. This facility will provide the industrial parks with water storage capacity for disposal of excess water during extended wet periods and the provision of a water supply during extended dry periods. There will be an additional cost for interconnecting piping and pumping units; however, these should be offset by reduced stormwater pond capacity construction costs and thus, the sale of additional land for industrial use. These savings to the industrial park owner will have to be used to offset the additional cost for interconnecting piping and pumping units.

7.3.2 TOWN OF COALDALE

7.3.2.1 WASTEWATER CHARACTERISITICS

Wastewater characteristics are determined by measuring the quantity and the quality of the sewage generated. The Town of Coaldale's wastewater strength or quality appears to be that of a typical domestic wastewater with the total suspended solids consistently higher than the BOD_5 (5-day Biochemical Oxygen Demand). When there is excessive dilution both of these parameters are reduced accordingly. There is limited or no data reported on nutrients or bacterial content as there is no regulatory limits on these parameters.

Alberta Environment's most recent approval to operate, Approval No. 540-02-00, was issued on October 13, 2006 and expires on October 1, 2016. When the treated wastewater effluent is discharged to the Oldman River, the only parameter which must be measured is $cBOD_5$ (carbonaceous 5-day Biochemical Oxygen Demand) which must be ≤ 25 mg/l as a monthly arithmetic mean of weekly grab samples. Composite samples of the effluent pumped to the Oldman River must be analyzed for TSS (total suspended solids) and BOD_5; however, there isn't a compliance requirement for these measurements. For the period January 2008 to December 2010, the $cBOD_5$ limit was only exceeded once, which was the result of a high reading on June 12, 2008. As soon as the non-compliant result was reported the total volume of the plant effluent was diverted to cell # 5 for storage and irrigation until July 12, 2008 following confirmation that the plant was again in compliance.

The wastewater quantity is a major problem as during extended wet weather events the daily flows to the plant can be significantly higher than the treatment plant design flow. On June 17, 2010, the daily flow to the plant was measured at 25,894 m^3/d, which was in excess of 10 times the average daily flow for the year. Efforts have been made to reduce the inflow and infiltration (I & I) to the sanitary sewers; however, in the older areas of the Town the I & I continues to be a major problem. It is anticipated that the major contributor is sump pumps in perimeter drains and without storm sewers, there is no place other than the sanitary sewer to dispose of this water.

The monthly averages of the daily flows are presented in Table 7.3. A comparison of the data for 2008 and 2009 with a 15 year average for the period 1990 to 2005, verify that there have been flow reductions. However, the six month period from April to September of 2010 and particularly April, May and June of 2010, show the impact of the wet weather period on the generation of the quantity of sewage as a result of aggressive measures by the Town.

Table 7.3 Monthly Average of Daily Flows 1990 to 2010

MONTH	1990 to 2005 Monthly Avg for 15 yrs (m^3/d)	2008 Monthly Avg (m^3/d)	2009 Monthly Avg (m^3/d)	2010 Monthly Avg (m^3/d)	2010 Maximum daily flow (m^3/d)
January	1,800	1,642	1,696	2,061	2,539
February	1,900	1,676	1,639	2,068	2,292
March	2,000	1,640	1,772	2,147	2,386
April	2,000	1,730	1,886	3,397	13,560
May	2,200	2,246	2,120	3,936	10,574
June	2,700	2,708	2,238	5,558	25,894
July	2,300	2,107	2,240	2,379	3,260
August	2,350	1,841	2,590	2,348	3,196
September	2,100	2,118	1,904	2,303	3,084
October	2,050	1,787	2,020	1,986	2,327
November	1,950	1,788	1,903	1,884	2,262
December	1,850	1,780	1,852	N/A	N/A

N/A - not available

7.3.2.2 THE EXISTING WASTEWATER TREATMENT SYSTEM

The sewage from the Town of Coaldale flows by gravity sewers to a lift station located in the northeast quadrant of the Town. The lift station has 4 - 60 HP pumps capable of pumping a total flow of 30.3 m^3/min or 43,600 m^3/d to the headworks of the WWTP which is a 4 cell aerated lagoon system with a fifth cell for effluent storage. The treated effluent is pumped through a 12 km 300 mm diameter forcemain to the Oldman River. The current maximum capacity of the river outfall is 2,390 m^3/d with one pump operating and 3,110 m^3/d with both pumps operating.

The WWTP plant is described in a plant upgrade study report entitled "Town of Coaldale Wastewater Treatment and Disposal Study" prepared by MPE Engineering Ltd. and submitted as a Draft report on December 15, 2005. As this report provides a detailed description of the plant and the plant's deficiencies, the plant description will not be repeated in this report.

There is currently no regulatory requirement for nutrient control or effluent disinfection for the Town of Coaldale. The Executive Summary of the upgrade study states that "Study findings indicate that the projected demands and environmental regulations are such that current municipal wastewater treatment and disposal facilities with modest upgrades will be adequate." As the study period was 20 years, if this statement is correct then there will be no requirement to upgrade the plant to achieve nutrient control and effluent disinfection when the plant's approval to operate is renewed in October 2016. If the regulatory regime for Coaldale changes with the 2016 approval renewal, then the upgrades will not be adequate.

The upgrades recommended in the study include:

- Replacement and relocation of the data acquisition and control system;
- Lift station improvements and increased wastewater pumping capacity;
- Construction of a flow control structure to divert storm surge wastewater to the irrigation cell for storage and subsequent treatment;
- Expanded capacity of the aeration system through the installation of more efficient blowers, high capacity aeration headers and additional aerators;
- Increased operating depth of the treatment cells along with improved biosolids settling and retention;
- Improved interconnection between treatment cells to improve maintenance and operating flexibility;
- Provisions for electrical power demand management strategies;
- Increased capacity of transfer and river outfall pumps; and
- Replacement of air release chambers on river outfall forcemain.

In 2007, an application was submitted for grant funding under the Federal/Provincial CAMRIF program for a $7.6 million Sanitary Sewer Backup and Flood Mitigation Project which would have addressed several of the above recommendations; the application was unfortunately unsuccessful.

The modifications proposed are extensive and will only provide an effluent which will continue to achieve the $cBOD_5$ limit when it is a known fact that nutrient removal and disinfection of effluents is becoming the accepted standard especially for the discharge of effluents to rivers that are being used as drinking water supplies. In fact, the draft 2010 Environment Canada WWTP effluent guidelines include chemicals of emerging concern in the proposed monitoring requirements.

There were no capital costs provided in the draft report which would have been required in order to assess the three alternatives presented. The capital costs for the upgrades need to be included for comparison with alternative options as the replacement of the existing aerated lagoon system with a biological nutrient removal (BNR) system capable of removing the nutrients and providing a disinfected effluent would be approximately $15 million. Unfortunately, the BNR technology would not be able to handle the flow variations which are being encountered and thus, a solution to the I & I problem would have to be implemented prior to introducing this high rate technology.

7.3.2.3 PROPOSED WASTEWATER TREATMENT PLANT UPGRADES

The program outlined for the private sector industrial parks in the County promotes the treatment and reuse of wastewater. It is suggested that during the five years prior to the renewal of the approval to operate for the Town's WWTP, that two studies be undertaken.

The first study should involve the development and implementation of a program to address the serious I & I issue which exists in homes constructed before the year 2000. The focus should be on the development of techniques and procedures which would provide options to collect this clean water and dispose of it in the expanded stormwater management system. These solutions will all be expensive as it would require the construction of an extensive underground storm sewer collection system throughout the older areas of town along with storage facilities. The most appropriate solutions should be demonstrated at a scale which will have a significant impact on the present problem. There should be grant money available for this initiative as it is a problem which exists across Canada.

The second study would involve an evaluation of options to upgrade the present effluent produced by the aerated lagoon system. Characterization studies followed by a pilot scale demonstration project processing a test stream of 100 m^3/day of effluent from cell # 4 would be an acceptable scale for a feasibility study. An effluent polishing step followed by discharge to an engineered wetland capable of removing the nutrients and providing disinfection prior to discharge into the Integrated Water Management Strategy major water storage facility would be an ideal solution. Funding is available for the creation of the wetland or the project could be implemented through a separate phase of the Integrated Water Management Strategy major water storage facility implementation program.

8.0 Economic Development Strategy

Executive Summary

A consortium of consultants were retained by the County of Lethbridge and the Town of Coaldale to prepare an Integrated Development Strategy (IDS). David Amos & Associates Ltd. was the lead firm to prepare the economic development strategy component.

The Economic Development Strategy reflects the input of key stakeholders, industry, residents, and municipal representatives. It is to be viewed as a "living document" subject to monitoring and refinement.

There are four strategic priorities that will drive the economic development strategy accompanied by fourteen key results. The key results are specific outcomes the municipalities will accomplish to realize the priorities.

Strategic Priority #1: Establish a cost effective economic development program and governance structure that is responsive to the needs of both the County of Lethbridge and Town of Coaldale.

Key Results #1: An economic development delivery model is agreed to and enacted upon by the County and the Town

Key Results #2: Economic development is an inclusive activity that avoids duplication and maximizes the use of resources.

Key Results #3: Responsibility for "cradle to grave" site selection and investor enquiries is clearly defined and agreed to.

Strategic Priority #2: Establish activity and performance monitoring that effectively advances economic development in the County corridor and Town of Coaldale.

Key Result #4: An economic development activity work plan that can grow as success occurs and is within the financial means of the Town/County is adopted.

Key Result #5: Performance measures to monitor economic development progress is established garnering confidence and support for the program

Key Result #6: Qualified economic development professional(s) are hired to lead and execute the economic development strategy.

Key Result #7: A high profile consistently delivered Business Retention & Expansion Program is delivered within the area.

Strategic Priority #3: Maximizing Canamex economic development spin offs, and minimizing its possible negative impacts

Key Result #8: Utilizing the services of Oldman River Regional Services Commission, the desired land use and intensity of development is predetermined for the Canamex interchanges.

Key Result #9: An attractive regional based tourist information centre is located at the highway #3/Canamex interchange.

Key Result #10: Mitigating measures are undertaken by Coaldale in addressing the introduction of Canamex.

Strategic Priority #4: Through effective communication and place recognition, economic development will be advanced in the Town of Coaldale and the County of Lethbridge.

Key Result #11: The term "Greenway" is used to describe the IDS area and reinforce its guiding principles.

Key Result #12: The Town and County become recognized as leaders in advocating and supporting partnerships.

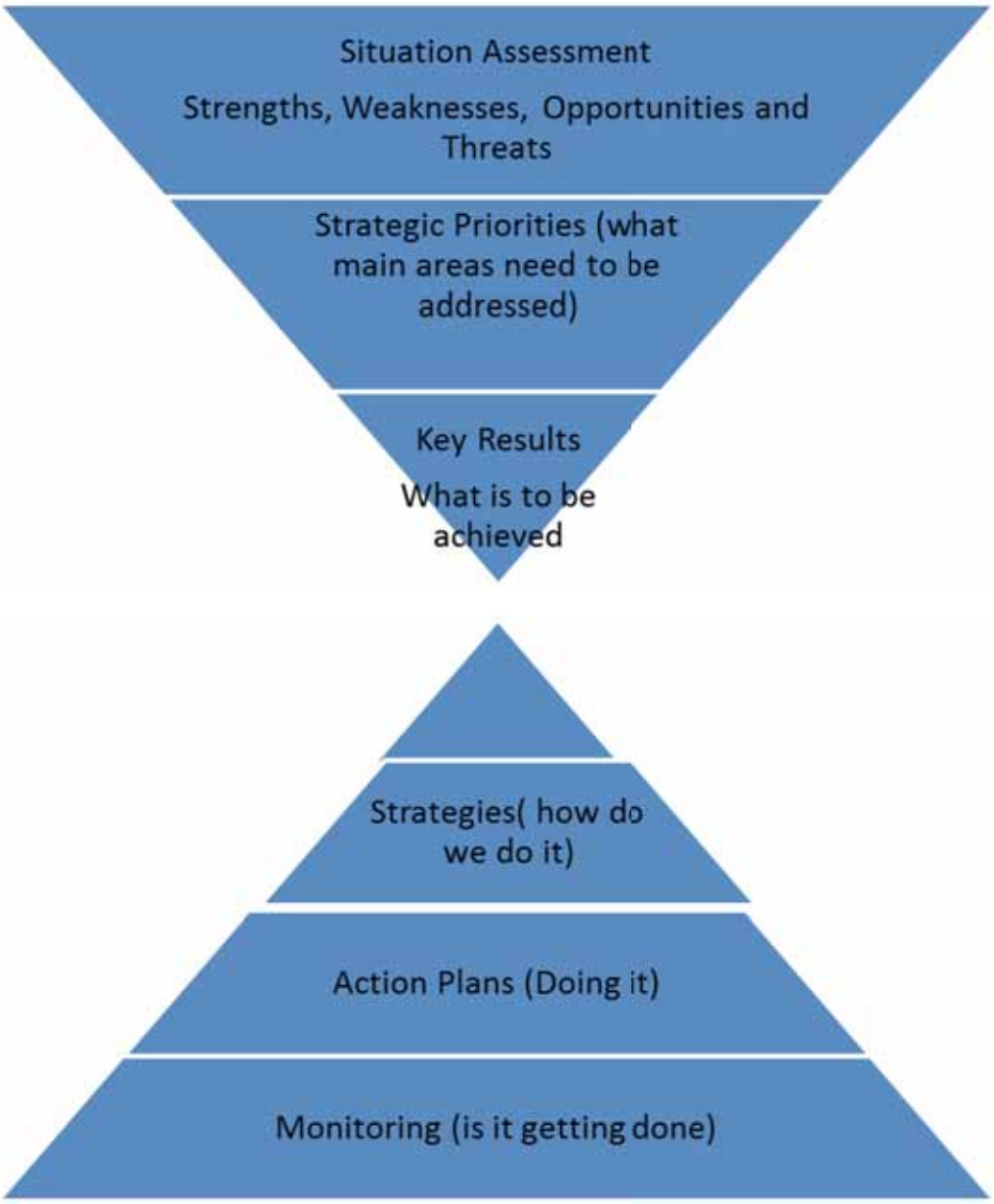
Key Results #13: Economic development becomes a community wide, tri –level government supported initiative.

Key Results #14: The area becomes known as "Alberta's Gateway to International Trade and Commerce".

8.1.1 Economic Development Strategy: Preparation Process

The Hourglass planning model, best depicts the approach used in preparing the Strategy

Strategy Development



The EDS process was designed to focus municipal resources on the critical aspects of economic development that will enable success over time. It involved:

- Understanding current economic development delivery practices in the area
- Establishing the economic base of the region including identification of strengths and vulnerabilities
- Determining the few things which, if done well and at the right time, will lead to success; these are called strategic priorities

- Identification of what needs to be done to achieve end results; these are called key results
- Specification of strategies to achieve desired results

In producing the EDS, the practice of defining a formal mission statement was dispensed with. It was felt that upon adoption of the inter-municipal strategy, its creation would best become the responsibility of the yet to be determined economic development governing body.

8.1.2 Regional Overview

The County of Lethbridge is located in the heart of southern Alberta approximately 80 KMS (50 Miles) from the US border. It occupies 2,400 square KM (11, 000 square miles) and is home to just under 11,000 residents.

The historic strength of the County has been agriculture. As in many similar jurisdictions in North America, there is a strong sense of tradition and community spirit that has served as a foundation for the area in good times and bad.

Small urban centres include; Barons, Nobleford, seven incorporated hamlets, Coalhurst, Picture Butte and the largest community, the Town of Coaldale (8,000 residents).

Blessed with numerous locational advantages including; some of Alberta's best irrigated lands, ready access to a network of highways, close proximity to the US market, the presence of the Canadian Pacific main line rail service, a regional airport, nearby big city amenities, post- secondary education institutions and government research facilities, growth in the County and Coaldale has been steady and consistent. But industry and other businesses have played a limited part in their development,and as a result,the municipalities remain heavily dependent upon a residential/agriculture tax base.

Historically, relationships between the County and Town have been "strained" at the administration and political levels. Despite the fact that what happens in one community often impacts another, the County of Lethbridge and the Town of Coaldale have worked in isolation. Political boundaries dividing the rural and urban areas have served to magnify challenges leading to increased economic barriers, hardship and lost investment. More recently, the gravity of the local situation has compelled administration and politicians to critically reassess the value of cooperation and more professional personal and political relationships, leading to increasing efforts towards regional based decision making. A growing level of trust in inter- municipal relationships bodes well for the development of solutions which are critical for effective economic development. At a time when a new sense of optimism is enveloping the Highway #3 corridor and is presenting an opportunity for population growth and tax base diversification, the need for new approaches and the sharing of benefits are being recognized.

8.2 Situation Assessment

The Situation Assessment reviews the economic base of the region, key factors driving the economy, and relevant trends that may impact the area in the short to long term. It considers the economic advantages of the region and addresses its economic positioning. It is the basis for the formulation of priorities related to the economic development strategy.

> Economic Development is an "investment" not a cost. It will generate prosperity and an improved quality of life for the County of Lethbridge and Town of Coaldale residents

8.2.1 Background

Preparation of the EDS was supported by a combination of:

- Literature Review

- Desk Research
- One-on-One interviews with key players from government, economic development support groups (Southgrow, Economic Development Lethbridge, Town of Coaldale, Chamber of Commerce, Community Futures), industry representatives, tourism operators, developers, finance, real estate, and post - secondary institutions
- Land Use Planning Charrette
- Strategic planning session with the Town of Coaldale's Economic Development and Tourism Committee
- Interviews with major infrastructure providers including Canadian Pacific Railway, St. Mary's River Irrigation District, and Lethbridge Municipal Airport
- A combined strategic planning session with both municipalities
- On-line and available hard copy Residents Opinion Survey

The key findings from this research are presented in the sections following:

8.2.2 Key Findings Driving the Strategy

8.2.2.1 Statistical Comparison

By comparing statistical data produced by the Financial Post Survey of Markets '09, between the County of Lethbridge/Town of Coaldale region with that of the Province of Alberta as a whole, and the areas of the City of Medicine Hat, Strathmore, and Red Deer, it became apparent that Lethbridge/Coaldale may not be capturing its fair share of economic development.

i) As seen in Table 1 Municipal Factor Comparisons, the County/Town's positive growth rate of 6.36% between the years of 2006 and 2009 was substantially less than that which occurred in other comparable areas. Its growth rate was the slowest, and was only 75% of that found throughout the Province of Alberta as a whole.

Table I

Municipal Factor Comparison

*2009 Statistics (Financial Post)

Factor	County/Town	Medicine Hat	Strathmore	Red Deer	Alberta
Population Growth (2006-2009)	6.36%	8.26%	26.72%	21.84%	8.54%
Income to National Average	.9% below	+2.0%	- .3%	+18%	+20%
Retail Sales	+63%	+44%	+99%	+81%	+44%
Average Household Income	$71,814	$78,800	$81,343	$92,836	$97,306
Level of Schooling					
College Certificate	22.2%	20.3%	24%	22.1%	
Apprenticeship	12.6%	13.77%	14%	14%	
Bachelor's	11.9%	7.6%	7.9%	10.3%	
Masters	2.7%	1.7%	1.6%	1.7%	
Doctorate	1.3%	.2%	.3%	.3%	

i) Lower Incomes

Average income for the County of Lethbridge and Town of Coaldale was approximately one percent below that of the national average and fully 20 percent below incomes registered in the Province and Red Deer area.

The discrepancy in income is further accentuated when comparing average household incomes. The County/Town with $71,814 was below Medicine Hat's $78,800, and Red Deer's $92,836 and the Province's $97,306.

ii) Level of Schooling

Due to the strong government, post- secondary education, and research employment base found in the County and City of Lethbridge, the area exhibits above normal education levels with four percent of the population having a Masters or Doctorate degree. This level easily surpasses that seen in Medicine Hat (1.9%), Strathmore (1.9%) and Red Deer (2%). However its apprenticeship levels were slightly below those in the other areas.

10.2.2.2 SWOT Analysis

The listings of Strengths, Weaknesses, Opportunities and Threats (SWOT) associated with the corridor area represent a summary of the factors as identified through the business/stakeholder interviews, resident opinion survey, and council sessions which may affect the ability to attract and retain business and investment. They will have varying degrees of importance depending upon the sector under consideration and the objectives of the investor.

The factors identified as "common" to both the County and Town are listed accordingly. While those factors considered to be mostly aligned with one particular municipality were highlighted as such.

"A Community has an Opportunity worth pursuing where assets/strengths align with Economic Demands"

Strengths

Common	Town of Coaldale	County of Lethbridge
Variety of trucking firms	Availability of competitively priced land	Rail – Burlington Northern in Shelby, Montana
Strong Business support services	Housing costs $15 – 20,000 less than Lethbridge	Border crossing only one hour away
Rural work ethic	Industrial space 15-20% less than the City	Irrigated Lands
Rail	Developer advantage- raw land costs, low development charges	Some business clustering, particularly agriculture
Presence of College as a source of employees	Supportive permitting and inspection staff	Rural open spaces
Proximity to Lethbridge	Small town atmosphere	Good soils
Stable economy	Mayor good ambassador, pro-development	Proximity of Agriculture Research Centre
Oldman River Regional Services Commission	Availability of full services	Shovel ready land
Good visibility, easy access/ egress	Local workers available	Quality of Life
Lifestyle/Living costs allows for lower wages	Big fish in little pond	
Proximity to border	Good Schools	
Access to higher educated base	Labour Availability	
Birds of Prey	Shovel ready sites	
Highway #3	Hockey School Sport Academies	
Vibrant Arts & Culture	Special Events	
University	Gem of the West Museum	
Birding/ photography		

Weaknesses

Common	Town of Coaldale	County of Lethbridge
Airport- time consuming connections, expensive Generally beyond just-in time delivery requirements to large industry Lack of local intermodal rail service Ministry of Environment – permitting delays, changing requirements Flooding Unbalanced tax base Inconsistent working history of cooperation Perception Irrigation District difficult to work with "No water" image Region viewed as branch office location Perception of development freeze Distance to market (sourcing of supplies, product) Oil & Gas wage competition No recognizable economic development point of contact Need for cradle to grave economic development responsibility	Permitting flexibility sometimes creates confusion Highway #3 rail congestion at crossover,safety concerns Lack of Economic Dev. Full time staff /office Reliance on volunteer's for tourism, economic development Appearance of industrial park (weeds, garbage, Lighting, buildings, etc.) Proximity of Lethbridge for retail competition, (discourages hotel investment) Lack of Big Business corporate sponsorship opportunities Decline of health care services High tax perception Lacks central gathering place opportunity Lack of bus service Perception Town/Chamber only care about downtown	Appearance of agri-business metal structures Lack of Economic Development profile City controls potable water New start-up farming costs prohibitive Primary industry has been on decline Poor investment returns (interest rate) US trucking permit requirements, restrictions Feed lot odour While agriculture core to attractive lifestyle, its tax base will not support strategic growth Aging farm operator population combined with increasing land values and input costs pose. uncertainty to future shape of agriculture

Opportunities

Common	Town of Coaldale	County of Lethbridge
Southern Alberta Alternative energy Partnership (solar, bio-fuel, wind, geo-thermal) Availability of water (Irrigation District, storm water capture, Town supply, City of Lethbridge) Maximize use of CP Rail Interlinking of regional trail system Greenway niche Non potable water usage Exposure to Research Centre students (25 from China, visiting Scientists, sabbaticals) College's research & training expertise in wind energy Tourism (Canadian Badland's, Chinook Country) Birds of Prey Key Provincial Industry Sectors • Primary Energy (Oil & Gas, Oil Sands) • Energy Service Industries • Value Added Energy (refined petroleum and chemicals) • *Primary Agriculture* • *Agra-Food (processed food and beverages)* • Engineering and construction • Information, Communication Technology • *Transportation and Logistics* • Financial Services • *Tourism*	Mennonite Auctions Port of Lethbridge inland container facility Sausage competition Compression Plants Arts & Crafts Colony Economic Development Office Food processing (building upon Birds of Prey Specialty retail/business Gem of the West acoustics Feed lot bio-energy, phosphorus rich Tourism Provision of affordable housing and a good lifestyle for families at 70% cost of City of Lethbridge Housing for rural retirees and seniors 100 mile diet Use of creative methods to develop urban lands without annexation Food processing presence Murals	Port of Lethbridge inland container facility Agri-business campus (cluster ag specialty products) Food processing (building upon successful experience of McCain's , Rogers, bean processing, etc. Intermodal service Canamex/Highway #3 interchange Immigrant entrepreneurs, Asian, Dutch, German (First choice BC, second Calgary) Feed lot bio-energy, phosphorus rich (most soils deficient in Southern Alberta) Warehousing (cheap, limited serviced lands, large parcels) Organic Farming 100 mile diet Niche immigrant market Recreation (Tourism) Offshore markets Guarantee Water Program Water Rural Living

Common	Town of Coaldale	County of Lethbridge
Extended heavy load routes may attract new industry and assist existing Handling of water issue can be accomplished collectively Presence of Irrigation District Eco-Industrial development (by-product of one industry may be feedstock for another) Population growth and tax base diversification Birding Photography Golf packages Day Trips Biking (both motorized, manual) Family bonding time		

Challenges

Common	Town of Coaldale	County of Lethbridge
How to build upon Greenway concept yet remain competitive • consumers generally support philosophically but not with wallet • even high end exclusive markets of Calgary and Vancouver have poor track records of success Impacts of Canamex • Highway #3 lights • Bypass • Perception too distant to think about On edge of Oil & Gas boom Water management & associated costs Maximization of return on infrastructure • Past, Present, Future How to maximize the presence of post-secondary institutions, agricultural Research Centre, prison How to create an alternative energy cluster without a formalized provincial incentive program Core area development Attracting businesses without incentives	Lack of Town Square Local jobs creation- *Live, Work, Play* , Core area development Increased competition Stand out identity Beautification (industrial area) Diversification of tax base Increase to tax base Promoting greater use of community facilities (exposure to users) As you respond to the pressures of development, retention of small town feel Canamex interchanges Canamex signage, recognition program	Ag Business Competition • Canadian Dollar • Distance to markets, • Automation consolidation • Rising input costs Provincial feedlot tax policies Increase to tax base Balancing development pressure vs. protection of agricultural lands Airport usage and operations (Passenger and aircraft movement remain below 2008& 2009 Protection of “isolated areas” for agricultural seed & crop research Attraction for feed lots vs Objections , (dry, Chinook serve as heat source, access to feeders & markets, transportation) How best to develop industrial lands Farm/country residential conflict

Common	Town of Coaldale	County of Lethbridge
Rising Canadian dollar Communication with residents • Sunnyside News circulation no longer subsidized to all homes • Renters do not see water bills Increasing international competition Distance to markets Perception “closed for business” Completion of Ports to Plains initiative Capitalizing on rail service Way finding signage program Competitive Preparedness		

8.3 Resident Opinion Survey

As part of the community consultation process, a resident opinion survey was prepared and made available for completion on line with hard copies at several box-drop locations. Residents and business owners were encouraged to complete the survey through mail notification by the Town, advertising in the Lethbridge Herald and Sunnyside News, twitter, the IDS website, and the Coaldale and Region Chamber of Commerce.

Over 125 participants provided feedback of the 30 question survey. A variety of community values, strategic directional preferences and other guidance was generated and may be summarized as:

- Residents have a sense of pride in their community
- Lifestyle factors such as a small town living, peaceful, friendly and family orientation rated high
- The provision of services such as fire prevention, library and schooling received high ratings while parks, road maintenance, and recreation facilities were poorly rated
- Over 90 percent of respondents rated economic development as a poorly rated service requiring improved communication and greater focus
- The area has a strength in hosting festivals and events
- Desire to increase local well-paying jobs opportunities that will encourage young families to locate and remain
- City of Lethbridge has a dominating influence in the area meeting most residents’ personal and retail/service

needs.

- Appears to be base support for public transportation
- Respect for existing character and housing types which should be enhanced rather than radically changed
- Desire to preserve yet build upon the agricultural strength of the area
- Support for a multi-facetted approach to economic development including tourism, industrial development, downtown revitalization, and business retention
- Insistence development be appropriate for its proposed location and that the environment be respected

8.4 Strategic Priorities and Key Results

8.4.1 Strategic Priorities

As a cumulative result of the aforementioned literature review, research, resident survey, SWOT analysis, interviews, and work sessions, Strategic Priorities have been identified to drive the Economic Development Strategy. They are:

- Governance: Establish a cost effective economic development program and governance structure that is responsive to the needs of both the County of Lethbridge and Town of Coaldale
- Activity expectations and performance monitoring: Establish activity and performance monitoring that effectively advances economic development in the County corridor and Town of Coaldale
- Canamex Highway: Maximize Canamex highway economic development spin-offs
- Communications and Place Recognition: Through effective communication and place recognition, economic development will be advanced in the Town of Coaldale and the County of Lethbridge.

Under each of the four strategic drivers a number of Key Results with their strategies have been listed.

8.5 Strategic Priority #1 : Governance and Delivery

Strategic Priority #1 Governance: Establish a cost effective means to implement the Economic Development Strategy that is responsive to the needs of both the County of Lethbridge and the Town of Coaldale.

8.5.1 Background

With over 8,000 economic development organizations in North America alone, economic development is a very competitive business.

The delivery of economic development in Canada ranges from Federal Government Departments to Provincial Ministries, to regional alliances, to municipal departments, to business redevelopment areas, to neighbourhood area projects. The further removed the organization is, the less control and focus on local issues and opportunities occur.

Within the context of the broader Southern Alberta region, there are a number of economic development related service providers as seen below:

- Community Futures Lethbridge Region — Focused on business loans, entrepreneur training, and community development assistance
- Southgrow Economic Alliance — Focused on studies, provincial connections. Future status in question
- Canadian Badlands Ltd. — Focused on tourism product development
- Chinook Country Tourist Association — Focused on tourism marketing
- Coaldale and District Chamber of Commerce — Focused on special events

assistance and business networking

- Canadian Badlands Foundation Focused on investment attraction and broader regional economic development

8.5.2 Local Economic Development Delivery

The Town of Coaldale has attempted to fulfill the economic development function through the use of part-time staff and volunteers, while the County of Lethbridge has outsourced the mandate to Economic Development Lethbridge without clearly stipulating expectations nor monitoring its performance.

Table 11 entitled Current Economic Development Delivery Analysis, provides an assessment of local economic development delivery. Clearly there is no cradle to grave responsibility in handling investment leads nor business retention issues.

In undertaking the consultations and preparation of this strategy, it became apparent there is limited awareness of what local economic development efforts presently occur.

During the interviews, industry representatives indicated contact by economic development representatives was virtually non-existent. Results of the Economic Development Resident Opinion Survey, reflected an abnormally low 90% poor to fair rating with only 2% rating the service as excellent.

Table II

CURRENT ECONOMIC DEVELOPMENT DELIVERY ANALYSIS

Organization	Town of Coaldale	County of Lethbridge
Description	Volunteer Board	Not-For-Profit Corporation, outsourced to EDL
	Assigned support staff	Mix of human resources, marketing, study focused
	Limited activity	Range of responsibilities
		Partnership with City
Pros	Minor cost	Cost shared
	Provides for community participation	Perception of being entrepreneurial
		Independent status
		Eliminates political boundaries
		Could lead to other partnering effort
Cons	Under budgeted	Stability
	Limited resources	Loss of micro issues
	Dependent upon volunteers commitment	Lack of sales responsibility
	Stability	Funder control
	Less likely to influence and persuade	Limited ability to speak on behalf of municipality
	Meeting frequency	Turf issues
		Overhead includes space
		Product development/ownership
		Credibility
		Performance measurements lacking
		Bottom line responsibility

8.5.3 Traits of a Successful Organization

A “Best Practice” review of economic development organizations revealed that the “one shoe fits all” approach is not applicable. Often, governance evolves over time according to changing mandates, objectives, resources, state of the economy, and political pressure. However there are common traits reflected by leading economic development delivery agencies. These are:

- Duplication of effort is avoided
    - Creation of similar splinter groups does not occur
    - Competition for monetary and volunteer support is prevented
    - Similar administration costs do not occur
- Has autonomy

    - Ability to speak with authority
    - Power to make things happen
- Inclusive versus exclusive
    - Includes community movers and shakers
    - Makes effective use of volunteers
- Has adequate funding
    - Multi-year commitment
    - Must match Strategic Plan action requirements
    - Adequately staffed
    - Little or no fundraising required
- Has frequent communication with support groups
    - Co-ordinated efforts
    - Recognized as a community effort
    - Allows for innovation, risk taking
    - Active in associations, networking
    - Maximize expenditures/effort that demonstrates benefits/returns
    - Non specific projects costs kept to a minimum

Most frequent “comments heard” with community representatives, Council members, senior administration, and business related to governance were;

- Unsure what is being done
- Council needs to show more leadership
- The business community wants to help
- Can’t go alone
- Need to spend money to make money
- Economic development more than beautification and special events
- Can’t expect volunteers to do it all
- Needs to be receptive to business
- Need to change current approach

8.5.4 Coaldale/Corridor Governance Alternatives

The challenge of creating an organization model to deliver economic development within the Town of Coaldale and corridor was reviewed during workshops and other discussions. However no clear organization preference evolved. As such it is recommended that upon adoption of the Integrated Development Strategy, further review occur.

The delivery models suggested below have been provided to assist in focussing the selection process. However governance consideration should not necessarily be restricted to those listed. Further details have been depicted in Table III.

- Status quo with modifications
- Contract services to Economic Development Lethbridge
- Contract services to Community Futures

- Contract services to Oldman River Regional Services Commission
- Create a new organization

Table III

Organization Alternatives

Organization Model	Description	Comments
Status Quo with "modifications"	County/Town would continue to provide service independently. Would agree to cooperate in areas of common interest and mutual benefit County service provided by EDL with a stipulation to focus on corridor area. Increase fee for service may be required Town should consider formalizing economic development as a departmental function with fulltime staffing and allocated budget IDS Committee with an expanded mandate could serve as the inter-municipal overseer	County should stipulate expectations of EDL and install performance monitoring criteria EDL should be requested to provide a dedicated County economic development officer with expertise in agriculture Need to provide for volunteer support and business input Quickest and perhaps cheapest to get underway HIghly dependent upon satisfaction level with EDL
Economic Development Lethbridge	EDL would be contracted to provide economic development services for the entire region including Coaldale Coaldale to provide fee for service on similar basis as County	See Table II, Current Economic Development Analysis, for pros/cons Organization name of Economic Development Lethbridge may require change to reflect inclusion of Coaldale May lose input/ expertise of municipal staff EDL implementing documents may need amendment City of Lethbridge support necessary
Community Futures Lethbridge	Would be contracted to provide the service May overlap with EDL's existing County service provisions Would require additional CF staffing support	CF assistance presently a free service Clearly defined mandate, expectations, reporting, and performance monitoring needed

Oldman River Regional Services Commission	Would be contracted to provide service Current fee schedule would require amendment Added staffing support would be necessary	Office location may be an issue in responding to clients. Would build upon a positive working relationship Direct link to planning support could lead to one-stop shopping Clearly defined mandate, expectations, reporting procedures, and performance monitoring needed What would be the expectations of other existing member municiplaities?
New Organization	New formal, collaborative partnership Possible creation under the Societies Act Funding agreement necessary Agreement to share incremental industrial, commercial, agricultural tax revenue Need to provide for business representation and voting rights Need a sunset clause of five to seven years forward to allow adequate working time yet an exit clause Appropriate bylaws to be passed Staffing support will need to be hired	Start up funding offsets should be explored Allows excellent control of economic development strategy Explore inclusion of IDS implementation responsibility Office location may be an issue County's agreement with EDL would require review Clear vision, mandate, operating guidelines, performance monitoring needed.

6.5.5 Key Results associated with Strategic Priority #1: To establish a cost effective economic development program and governance structure that is responsive to the needs of both the County of Lethbridge and Town of Coaldale are:

Key Results	Responsibility	Partners	Performance Measures
An economic development delivery model is agreed upon by the County and Town	Council Senior Staff IDS Steering Committee	Town of Coaldale's Economic Development & Tourism Committee Chamber of Commerce Economic Development support Groups	Organization model adopted Funding formula agreed to and implementing bylaws passed within 6 months of IDS adoption Agreement reflects multi-year commitment with exit clause Mandate will match desired economic development vision and goals/objectives
Economic Development is an inclusive activity that avoids duplication and maximizes the use of resources	Council Senior Staff Economic development groups	Private Sector Chinook Country Tourist Assc Canadian Badlands Ltd. Community Futures Lethbridge Oldman River Regional Services Commission	There are no economic development delivery service gaps in the area Strong partnerships Limited duplication of effort Efficient use of resources and funding Cost sharing initiatives underway Efficient use of volunteer participation
Responsibility for "cradle to grave" site selection and investor enquiry is clearly defined and agreed to	Governance Body Council Senior Staff Ec D support groups	Economic Development Support Groups	Receive high economic delivery customer service ratings Site selection and investment process transparent Defined lines of responsibility understood and adopted

8.6 Strategic Priority #2: Activity and Work Performance

Strategic Priority #2: *Establish activity and performance monitoring that effectively advances economic development in the County corridor and Town of Coaldale*

8.6.1 Activity

The operations of an economic development organization are generally influenced by four major inter-related actions that are supported by a number of activities.

1. Resources and actions which will assist in the retention of exiting business and ,
2. Resources and actions which will lead to the expansion of existing business and,
3. Resources and actions which will attract new business and investment and,
4. Resources and actions which will encourage entrepreneurship.

These actions are supported by a number of activities.

To better appreciate the scope of work undertaken by best practice economic development operations, an Activity Checklist (see Table IV) was prepared and reviewed with Council's and their staff at the municipal workshop. The checklist as completed by the participants, indicates that many functions undertaken by progressive economic development operations were lacking in the area. In some cases, the activity may very well occur, but there was no such awareness by the participants.

The activity checklist can serve as a tool to identify service gaps and to prioritize activities of the economic development function. The level to which the checklist is expected to be undertaken will dictate staffing numbers, needed expertise, and budget requirements.

Table IV

ECONOMIC DEVELOPMENT ACTIVITY CHECKLIST

ACTIVITY PILLARS	ACTIVITY	TOWN	COUNTY
INVESTMENT PROCUREMENT			
	Annual competitive analysis	x	X
	Annual Wage Survey	X	x
	Community Profile	✓	✓
	Investor Package	x	✓
	Website Support	✓	✓
	Ambassador Program	x	X
	Lure/Marketing Material	✓	✓
	Business Directory	✓	X
	Dedicated Processor	X	x
	Site & Building Database	x	X
	Personal Contact	X	x
	Site Visits	x	x
	Networking	✓	✓
	Local Business Support	✓	✓
	Tradeshows	x	X
	Incentive Program Support	x	x
	Provincial/Regional Cooperation	✓	✓
	Inter-agency Cooperation	✓	✓
PRODUCT DEVELOPMENT			
	Public/Private Partnership	x	X
	Database	X	x
	Incubator	x	✓
	Inventory of shovel ready sites	✓	x
	Infrastructure Enhancement Program	x	x
	Aggressive grant leverage program	x	✓

BR& E			
	Support Chamber and other business groups	✓	✓
	Space needs assistance	x	X
	Sector specialist	X	x
	Business calling program	x	X
	Business Surveys	X	x
	Education/Training	x	x
	Recognition Programs	✓	X
	Local sourcing assistance	X	x
	Business to Business programs	x	X
	Workforce development	✓	x
	Market Development Assistance	x	X
	Red Flag Response Team	X	x
	Employee Needs Assessment	x	X
	Business Exit Survey	x	x
ENTREPRENEURSHIP			
	Mentoring Programs	✓	✓
	Access to financing	✓	✓
	Networking Support	✓	✓
ENTREPRENEURSHIP	Market development assistance	✓	✓
	Training	✓	✓
	Government program/support dissemination	X	x
CORE AREA	Strategy	x	n/a
	Financial assistance program(s)	x	n/a
	Building Space Assessment	X	n/a
	Gap analysis	x	n/a
	Database	X	n/a
	Supportive bylaws/permitting	x	n/a
TOURISM		✓	✓
	Special Events Assistance	✓	✓
	Product Development/Enhancement	x	X
	Regional Marketing	✓	✓
	Recognition Program	x	X
	Information Centre/Distribution	✓	x
	Packaging Program	x	X
	Inventory of Accommodations	X	x
	Events Calendar	✓	✓
	Website Support	✓	✓
	Arts & Culture Inventory	✓	X
	Advocacy	✓	x
	Community Support	x	X
	Training/Education	X	x
	Partnership with support agencies	✓	✓
	Participate in Regional Initiatives	✓	✓

NOTE: X Identified as not currently undertaken

✓ Identified as undertaken

8.6.1.1 Business Retention & Expansion (BR+E)

Discussion with local employers revealed there was a lack of consistent rapport and contact between municipal representatives and business. Yet for most communities, the majority of new job creation comes from firms already in the area. As such, it is imperative a business retention and expansion program be initiated.

Working with local business is often seen as a less attractive activity to undertake as work occurs behind the scenes and doesn't create the excitement of announcing a new business. However BR+E, should be viewed as crucial support to investment attraction efforts. Firms do not locate to an area because of fancy marketing materials. They often follow others where success has been proven and where they know a responsive supportive community exists. As part of the site selection process, firms will often approach companies already in the community to garner their rating of the area as a business location.

A business and expansion initiative works to improve the competitiveness of local businesses, builds upon development opportunities, and increases the capacity of a community through the provision of training and networking.

> Business follows other successful Business

BR+E also provides:

- An avenue of communication between business and local government
- Identifies business operational issues and barriers
- Provides firms with an awareness of available resources to assist them and an opportunity to deploy this assistance
- Lends credibility to an economic development program
- Creates ambassadors and good customer relations

8.6.2 Performance Measures

Historical documentation reflecting the results of past economic development activities is absent within the corridor area and Town. Whatever future economic development delivery structure is selected, it will serve many audiences that will need to be able to evaluate its performance. Indicators of a successful economic development program will raise the confidence of the private sector and encourage continued contribution in leadership and expertise. A successful program will also continue to attract political support and direct financial assistance.

Performance measures should be developed cooperatively between staff, council and the delivery organization. These measures should be SMART

- Specific
- Measurable
- Relevant
- Time based

Suggested quantitative measures include:

- Clients generated
- Number businesses assisted
- Jobs created
- Retail space absorbed

- Building space occupied
- Inquires generated
- Tax dollars generated
- Industrial/commercial lands sold
- Building permit values
- Number of new companies
- Occupancy rates
- Special events assisted
- Tourism statistics

The establishment of data collection procedures to ensure data availability and consistency must be agreed upon. Longer term goals such as improving medium incomes and local retail figures should be split into single year objectives.

Formal recording of measurements may occur by using the formatted table below:

Table V

Measuring Success

Objective	
Description	
Data Required	
Source	
Impact of Attainment	

A comparison to historical benchmarks and /or comparison to other similar jurisdictions is encouraged. These may be broken down further into levels of activities (ie) numbers of clients generated, number of start-ups, and such. In all cases it is necessary to demonstrate value.

6.3 Key results supporting Strategic Priority #2: Establish activity and performance monitoring that effectively advances economic development in the County corridor and Town of Coaldale are:

Key Result	Responsibility	Partners	Performance Measures
An economic development activity work plan that can grow as success occurs and is within the financial means of the Town/ County is adopted	Council EDO Senior Staff Governing body	Economic Development Groups Other	Work plan is successfully undertaken An equitable distribution of economic development activity occurs within the County and the Town
Performance measures to monitor economic development progress are established garnering confidences and support for the program	Council EDO Senior Staff Governing body	As required	Performance monitoring occurs on a regular basis Activity work plan may be amended as required
Qualified economic development professional(s) are hired to lead and execute the EDS	Governing body	As required	Qualified professional staff are hired EDO garners the respect and cooperation of business, politicians, partnering agencies, and other staff
A high profile, consistently delivered Business Retention & Expansion program is delivered within the area	EDO Mayor/Reeve Senior Staff Support Agencies/Personnel	As required	A minimum of 24 businesses are called upon annually Council and senior staff are recognized as leaders and advocates of economic development Surveys reflect a positive economic development service rating Consistent rapport and contact is maintained with local business

8.7 Strategic Priority #3: Canamex Highway

Strategic Priority #3: *Maximizing Canamex Highway economic development spins offs and minimizing its possible negative impacts*

Transportation and the ability to effectively move people and to receive/ship goods and materials, is consistently identified as one of the primary factors affecting the performance of business. The County and Coaldale are fortunate in this regard having an excellent network of roads, highlighted by highway 's #3 and #4 that traverse the area. This strategic advantage is expected to be further enhanced with the completion of the Canamex highway, leading to both opportunities and challenges for the region.

8.7.1 Canamex Trade Corridor

The Canamex is a proposed 6,000 km highway based trade corridor stretching from Anchorage, Alaska, to Mexico. Upon its crossing at the Canada/US border at Coutt's, the route will parallel interstate Route 15 and run through the States of Montana, Idaho, Utah, Nevada, and Arizona, plus the western Mexican states.

Initiated by the Province of Alberta, the primary purpose of the Corridor is to improve efficiencies of moving goods and people between Mexico, US and Canada.

The stated goals of the Canamex Trade Corridor are;

- Improve access for the north-south flow of goods, people, and information;
- Increase transport productivity and reduce transportation costs;
- Promote a seamless and efficient intermodal transport system;
- Reduce administration and enforcement costs through harmonized regulations

It is believed these goals will facilitate the growth of trade and subsequent economic development of communities along its corridor.

While construction of the Canamex is perceived by some to be distant and not relevant for today's business planning, others expressed concern over the potential economic impacts associated with creating a bypass around Coaldale. It is expected the concerns will increase as construction nears.

8.7.1.1 Assessment

The basis for analysing potential Canamex impacts was to consider the experience of other communities that had major highways constructed in their areas. Unfortunately actual impacts that have occurred in Alberta centres subsequent to being bypassed are not available. Lacking Alberta provincial reports, research was dependent upon work undertaken in eight State of Kentucky counties, 23 communities in Texas, 17 communities in Wisconsin, findings of 100 other US Towns, and two studies in the Maritime provinces. Communities that were studied ranged in size from a population of 310 to over 28,000.

The case studies suggested that new bypasses are seldom the destroyer or saviour of an area. The size and overall strength of a town is the principal factor in whether a community suffers economically as a result of a bypass. Those communities with a developed downtown customer base and history as a trade centre experienced less negative impacts. The smaller the Town (typically under 2,500 population) the more negative the impact.

Impacts varied according to the nature of business in question. Traffic dependent businesses such as restaurants and gas stations were most likely to be affected but to a less degree than anticipated, since drive-through traffic actually made up a smaller proportion of sales than perceived by residents. Business located on Main Street in particular lost sales that originated with unscheduled stopovers from highway travellers. It was also found that retail and employment growth rates of bypassed communities were generally less than non bypassed.

8.7.1.2 Implications for the County of Lethbridge

The introduction of the Canamex is expected to improve the accessibility to suppliers and markets for existing business. It will also further enhance the County of Lethbridge's competitive position for tax producing retail, commercial, and industrial development.

Of particular interest will be the highway #3 interchange for industrial activity and power centres anchored by mass merchandisers and category killer big box stores. A service node to support high-wide-and heavy trucks and other passing trade will be needed. The node will be expected to provide fast food, fuel, other convenience retail, and accomodations. Additional detals are found in the Land Use segment of the IDS.

Area interchanges will be seen as excellent jump-off points to possible new residential subdivisions. A centre accommodating Canamex RV users and campers would be ideally located at the highway #3 junction. From this site and the service centre, tourists and others could be enticed to further explore opportunities and points-of-interests elsewhere in the County and Town of Coaldale.

The intensity of development along the Canamex will be subject to the level of available servicing. In the absence of water and sewer services, major development is not expected to occur. As per the Integrated Development Strategy, utilization of storm water as an effective means of meeting their water needs should be explored with business and developers.

In preparation of the Canamex, the County of Lethbridge shall,

- Be proactive in its planning to control undesirable sprawl and over development of retail space.
- Be proactive in adjusting to its new client base and traffic flows
- Give consideration to establishing a tourist information services centre at Highway #3/Canamex corridor interchange in cooperation with the Town of Coadale.

8.7.1.3 Implications for Coaldale

Construction of Canamex is not expected to cause immediate repercussions to Coaldale; however, in the long term, the development effects could be profound.

With the County's increased attractiveness to industry and its ability to offer cheaper large scale greenfield sites, it will be imperative for Coaldale to differentiate itself in efforts to attract business. Higher industrial park onsite standards, architectural controls, and greater levels of servicing should be maintained.

Already faced with substantial retail/service leakage to the much larger City of Lethbridge, even greater revenue loss could occur dependent upon the scale and mix of business allowed to be undertaken at Canamex interchanges. As the bypass is built, increased business vacancies in the core may be expected. Some businesses may choose to relocate to Canamex oriented venues, while others may choose to continue on with reduced sales, or go out of business rather than adjust to changed circumstances caused by the bypass and other factors.

The locational shift in traffic resulting from Canamex should be viewed as a catalyst to change the orientation of the downtown to a centre of specialized activity. To refocus the core from drive through traffic business to more destination oriented operations such as offices, financial, entertainment, and food services.

With the circumvention of heavy truck traffic, a more pleasant and less congested atmosphere on Main Street will result. By capitalizing on the character of the community, there will be greater opportunities to attract day trippers and pedestrian flows. Destination based tourist attractions could also be developed by building upon operations already in existence such as the Birds of Prey.

In preparation of the Canamex, the Town of Coaldale shall,

- Be proactive in undertaking mitigating measures including providing tourist information services at the highway
- Develop visually attractive "gateways" including interchange lighting and landscaping
- Undertake a Core Area Master Plan that provides Main Street revitalization guidance.
- Consider the creation of a Downtown Marketing Zone (DMZ)
- Encourage visually appealing upgrades to industrial park areas, perhaps through implementation of an aesthetics awards program
- Create an economic development arm with a full-time economic development officer to adjust to changes and take advantage of development opportunities
- Link the regional pathway system with the core area and major attractions (see IDS for details)

8.7.2 Key Results to drive Strategic Priority #3: *Maximizing Canamex highway economic development spin offs and minimizing its possible negative impacts*

Key Results	Responsibility	Partners	Performance Measures
Utilizing the services of Oldman River Regional Services Commission, the desired land use and intensity of development is predetermined for the Canamex interchanges	EDO Council Planning Officer	Oldman River Regional Services Commission Land Owners Province	Planning tools and legislated documents in place to accommodate appropriate interchange development The County is seen as being proactive in adjusting to its new client base and traffic flow
An attractive regional based tourist information centre is located at the highway #3/Canamex interchange	EDO	Province Chinook Country Chamber of Commerce Canadian Badlands Ltd Tourism & Special Events operators Accommodations	Traffic utilizing the Canamex is drawn to the County and Town Visually attractive interchange lighting and landscaping supports the effort Merits and feasibility of a camper/RV park considered

Mitigating measures are undertaken by Coaldale in addressing the introduction of the Canamex	EDO Council Senior Staff	Chamber Business Economic Development Committee Tourism other	An aggressive way finding program to steer Canamex traffic to area attractions, accommodations, services and retail opportunities is implemented A core area master plan that addresses beautification, gap analysis, and consideration of a downtown marketing zone is prepared for main street rejuvenation A fulltime qualified EDO hired to assist the community in adjusting to change and take advantage of development opportunities

8.8 Strategic Priority #4:Communication and Place Recognition

Strategic Priority #4: Through effective communication and place recognition, economic development will be advanced in the Town of Coaldale and the County of Lethbridge.

The resident's opinion survey and business interviews revealed a distinct lack of community awareness regarding economic development efforts in the area. While there are several agencies actively engaged in economic development related activity, there is a general perception that little of consequence is being done.

There is a desire by local business and others to be engaged beyond special events, but who to contact and how to proceed is not known. Without knowledge of initiatives underway, the community at large is unable to lend support and assume a possible role as ambassadors.

There is also the need to overcome negative perceptions related to permitting delays, flooding issues, extraordinary environmental restrictions, and lack of inter-municipal cooperation.

> Perception is often seen as reality

8.8.1 Communication

Communication timing and tactics must integrate with the various components of the EDS and IDS as implementation occurs. It should be a two pronged approach that simultaneously connects with both internal and external audiences.

Internal audiences include:

- Municipal councils
- Staff
- Residents

- Existing business and entrepreneurs
- Local media
- Economic development support groups
- Investors

External audiences include:

- Prospective business
- Developers and investors
- Entrepreneurs
- Tourists
- Potential residents
- Senior levels of government

Due to the extensive intercommunication which occurs amongst the different audiences, a consistent unified methodology is required.

The economic development effort needs to project itself as being proactive and primarily concerned with getting tangible, pragmatic and visible projects underway. It should be designed to bring together key stakeholders and the public at large to work collaboratively towards economic gain. To simply advertise that there is an economic plan is not enough and will not generate positive results – it must become a philosophy for all internal stakeholders to ensure external audiences believe and buy into the area. Communication must positively engage stakeholders and mobilize them to become champions of economic development.

Communication should focus on basic tactics:

- convey a new economic development focus on the corridor and area
- publicize progress to internal and external audiences
- create confidence in the effort

Council's for the County of Lethbridge and Town of Coaldale must ensure that economic development communication is positive and projected as a "team". Because an active economic development program will generate the involvement of various municipal departments for their assistance and expertise, it is important that senior staff buy into the initiative. That the economic development effort not be seen as creating "more work" but rather as an opportunity to be involved in creating a better community in which to live, work, and play.

It has been shown that economic development strategies are only effectively achieved if those most directly affected by their outcome are involved in their creation and delivery. As such, the private sector has a vital role to play in economic development.

Specifically, the private sector may:

- Serve as ambassadors through business advice, welcoming committees, and cooperative marketing efforts
- Generate leads and referrals through their contacts, and purchasing/sales activities
- Provide valuable sales and marketing assistance
- Lend credibility to the economic development effort
- Identify business and sector opportunities
- Serve as eyes/ears into the business community
- Provide lobbying assistance
- Identify business needs and concerns
- Lend staff expertise
- Be effective task force participants

A consistent business calling program as part of a retention initiative is an excellent way to maintain communication with local business. This may be augmented through the use of task forces.

Regular breakfast sessions hosted by the Mayor/Reeve can effectively broaden the audience base to include media and volunteers. These sessions should be focussed upon economic updates and dissemination of market intelligence.

Use of municipal web sites provides for interactive dialogue with the community at large. Direct mailings, press releases, news inserts, media interviews, speaking engagements, newsletters and production of an annual Business Trends and Development Report, are also communication tools which may be used.

Effective two way communication with senior levels of government and area economic development support agencies can lead to strong partnerships and a unified approach to economic development.

Federal and Provincial political representatives should:

- Receive copies of press releases and good news stories
- Be forewarned of any major company closings or layoffs
- Be provided with pre-announcement notices of business expansions or major investments
- Be invited to ribbon cuttings and economic development related functions
- Be invited to speak to Council's on relevant provincial or national issues
- Be encouraged to monitor the availability of grant programs
- Assist in obtaining meetings with Ministers, Deputy Ministers, or other key government officials as needed
- Meet periodically with Mayor/Reeve

Government Departments

- EDO to meet regularly with key government personnel in pertinent positions
- Relevant personnel to be made aware of issues discussed with MLA, MP, and Ministers

Support Agencies

- Ongoing rapport to be established
- Relevant board appointments and representation
- Assistance to be solicited
- Should be encouraged to report activities directly to Council

8.8.2 Place Recognition

Raising awareness of the area's unique focus on environmental/conservation best practices and its development attributes is vital to capturing its full economic potential. But until such times that the other strategic priorities within the EDS have been enacted upon, it is premature to enter into a formal branding program. However place recognition may best occur for the corridor lands through the use of the term "Greenway" within the overall regional context as "Alberta's Gateway to International Trade and Commerce".

8.8.2.1 Alberta's Gateway to International Trade and Commerce

The region is ideally positioned to promote itself as Alberta's Gateway to International Trade and Commerce. It is not intended for the reference to detract from the town of Coaldale's affiliation with Birds of Prey. The use of gateway will indicate interest in economic development activity beyond a tourism focus.

Alberta is the only province in Canada bordering the United States to have only a single 24 hour border crossing. This crossing is located at Sweet Grass/Coutt's approximately 50 miles (80 km) south of the corridor lands. As such, the County and Town are the first area of consequence with a major collection of businesses and urban amenities.

Canada is the state of Montana's most important market, purchasing more from the state than all other countries

combined. According to trans border data, bilateral trade flow is over $6.5 billion with the largest proportion of trade in energy, chemicals, metals and fabricated metals. The majority of Montana's exports occur through the Coutts's crossing.

Top exports include:

- Paper and paperboard ($51 million)
- Automotive ($20 million)
- Electric generators ($23 million)
- Crude petroleum ($39 million)
- Plywood ($10 million)

Historically Canada and the US favoured east to west trade routes before reaching north-south markets. President Obama and his administration set a goal in 2010 of doubling his country's exports. Given that Canada is Americas largest trading partner, much of this increase in commercial activity will be fuelled by developments such as the Canamex.

Over 1.3 million traveller's pass through Coutt's every year. This is supplemented by nearly 500,000 trucks whose volume has increased an average of 9.1 percent per annum over the last decade.

Based upon projected resource developments and activity associated with the Bakken and other shale gas plays, it is estimated that an additional $4 billion of machinery and equipment will need to be imported into Alberta every year by truck, representing 40,000 truckloads per year over current volumes. In 10 years this is translated to over 400,000 truckloads inbound from the US each year, resulting in having an inbound truck every three minutes, 24 hours a day, seven days a week, 365 days a year.

8.8.2.2 Greenway

In moving forward the work and recommendations of the IDS along the highway #3 corridor, it is important that the area be easily recognized both conceptually and geographically. The description "Greenway" embraces the concept of sustainability and conservation on a linear basis, and captures the community's imagination.

The term "Greenway" is defined as a region with the goal of self-sufficiency, gained by successfully integrating innovative practices in the fields of planning, transportation, stormwater management and reuse, localized water treatment and water supply, economic development, and recreational opportunities. Residents are able to live, work, and play in urban pockets separated by linear corridors of open countryside. These linear corridors may be utilized for stormwater management areas and both low intensity agricultural uses such as pasture lands and cultivated fields, and recreational uses including natural areas, parks, and pathways.

The degree to which the municipal councils and development industry embrace the IDS concepts and principles over the long term is unknown. But by integrating operations/expenditures through a variety of partnerships and cost sharing initiatives to address;

- Conservation practices
- Parks and open space
- Planning
- Land development
- Education & training opportunities
- Tourism

The Greenway can become a best practice model of stewardship and municipal collaboration for purposes of economic development, and life style enhancement.

8.8.3 Key results to support Strategic Priority #4:*Through effective communication and place recognition, economic development will be advanced in the Town of Coaldale and the County of Lethbridge.*

Key Results	Responsibility	Partners	Performance Measures
The term "Greenway" is used to define the IDS area and reinforce its guiding principles	EDO Council Staff Mayor/Reeve	MP, MLA Support agencies Senior levels of government	Survey indicates strong "Greenway" awareness Signage and IDS implementation supports the terminology Area becomes known as a "Best Practice" Greenway terminology is utilized by the media and other audiences Reference in materials, website, and discussion
The Town and County become recognized as leaders in advocating and supporting partnership	See above	See above	Number of effective partnerships and joint initiatives Cost savings, breadth of additional opportunities generated Participation on associated boards, committees and such Acknowledgment by others

Economic development becomes a community wide, tri government level supported initiative	See above	See above plus Volunteers Private Sector	Degree of private sector participation as ambassadors and task force members Volunteer participation Engagement of senior government officials and political representatives Level of media coverage Annual economic development update produced and widely distributed via web and hard copy Transparency of the economic development effort Business calling program is initiated Mayor/Reeve host regular economic development updates Generation of grant support and other offsets

The area becomes known a "Alberta's Gateway to International Trade and Commerce"	See above	See above	Investment procurement success Recognition level by media and other audiences Endorsement and support of the province Clustering activity Reference in materials, website

8.9 Conclusion

No amount of marketing will convince people and business to make financial decisions if a community doesn't offer what they want or need to be successful.

The County of Lethbridge and Town of Coaldale face many of the challenges typically found in rural Alberta. It is influenced both positively and negatively by global, national and regional economic trends, competitive activities of other regions, and economic cycles of the industries that drive the area's economy. Both municipal council's wish to experience the benefits of growth and development by moving strategically forward.

The way forward includes:

- Act inclusively, using the creativity and energy of business and citizens
- Be proactive
- Maintain broad awareness of the economic development effort
- Prepare yourself and undertake an agreed upon delivery methodology for the area

The economic development strategy speaks of the above approach in the form of strategic priorities and key results. The plan should be reviewed and revised annually, providing the opportunity to celebrate success and revise direction.

9.0 Regional Pathway System

9.1 Regional Pathway System

An important aspect of Integrated Development Strategy is to incorporate a Regional Pathway System to provide for alternative modes of transportation while at the same time responding to recreational needs within the area.

Since the Integrated Development Strategy (IDS) included a major review of overland drainage the concept of incorporating a Regional Pathway into the same Right-Of-Way as portions of the overland drainage was developed. The St. Mary's Regional Irrigation District had been holding maintenance of the drainage Right of Ways in abeyance and the timing in this regard could not have been more fortuitous. The SMRID has also recognized the need to expand the Right-Of-Way in order to manage drainage swales, such as the South Coaldale lateral, effectively. Expansion of the right-of-way's will accommodate and facilitate this management.

Commemorative plaque clarifying the St. Mary's River Irrigation District involvement at Henderson Lake

9.2 Pathway Destinations

In order for the regional pathway system to be viable and to attract activity to the path from a recreational perspective it is important to identify attractive destinations on each end of the system. Two anchor points that have the potential of drawing international acclaim and attention are readily available within the study area.

9.2.1 Henderson Park

On the east edge of Lethbridge on the western edge of the IDS study area the recreational area known as Henderson Park provides an optimized destination for the regional pathway. The Henderson Park is a 47 ha (hundred and 17 acre) park featuring a 24 ha (60 acre) man-made lake the largest lake in the city of Lethbridge area and features numerous amenities and attractions.

Nikka Yuko Japanese Garden

One of the most famous is the Nikka Yuko Japanese Garden; the Japanese Garden draws visitors from international destinations. Nikka Yuko expresses the merging of Japanese and Canadian culture in a garden rich in symbolism designed by Japanese garden designer landscape architect Tadashi.

Henderson Swimming Pool

One of Lethbridge's finest aquatic facilities in the form of the Henderson Lake Pool provides another natural destination. Henderson pool is, in both water volume and surface area, the largest swimming facility in Lethbridge and area. The pool is surrounded by a large grassed area ideally suited to sunbathing and socializing and its cloverleaf design makes it particularly aesthetically appealing. The facility also features an outdoor concession and a sand volleyball court. During the summer months Henderson Pool has highest bather loads in the City of Lethbridge.

The Henderson Lake Golf Course is located on Henderson Lake taking up the full width of the lake frontage on the South side. Henderson Lake golf course is a championship length 18-hole course lying on mature prime real estate in the heart of Lethbridge. It has excellent maintained fairways relatively level and of average width with manicured

greens. Challenge is provided by the large amounts of water and sand in play throughout the course.

The Henderson Campground is a year-round campground located just east of the park on Parkside Drive featuring full and partial hookup sites, washrooms, laundromat, store, and playground equipment.

The Henderson tennis courts are operated by the Lethbridge Tennis Club featuring a clubhouse and six lit Plexy–Pave tennis courts.

The Henderson Park Ice Center located on the north side of Henderson Park has a full-size and mini size rink available for private rentals from September to early April the center seat 700 and hosts tournaments.

Henderson Park also features the Spitz Stadium which is a lighted baseball stadium home to the Lethbridge Bulls and seats more than 3000 people.

Henderson Park also features a Rose Garden which is situated in the northwest corner of the park. The Rose Garden was originally developed in conjunction with the Girl Guides and is a popular area for wedding photos.

Pathway network around Henderson Lake

Henderson Park facilities are connected by comprehensive trail infrastructure of paved trails available for walking, jogging, cycling and in-line skating. The two largest trails circumvent the lake with a 2.8 km system and the parks perimeter with a 4.3 km system. This trail system is further augmented by virtue of the Coal Banks Trail which runs through the Park.

9.2.2 Alberta Birds of Prey Centre

The Alberta Birds of Prey Centre was founded by the Alberta Birds of Prey Foundation, Alberta's oldest privately licensed raptor rescue and conservation organization. The facility responds to the need for aviation rehabilitation in Southern Alberta working to rehabilitate and release injured birds of prey, breed captive birds that are endangered, and release the offspring into the wild. As well, the Centre educates the public about the birds of prey and bird conservation.

Alberta Birds of Prey Centre

The infrastructure the Alberta Birds of Prey Centre was originally constructed to provide for storm water management. The IDS recognizes an opportunity for expansion of the Alberta Birds of Prey Centre and incorporates it as an augmented opportunity to capture and hold regional storm water. Landowners in the vicinity of the Alberta Birds of Prey Centre have been approached regarding accommodating this expansion on their land and they have indicated that they are open to exploring this potential.

9.3 Path Location

The proposed pathway location and alignment has been identified in the course of the evaluation for the IDS.

The pathway would start at Henderson Park with the point of connectivity to the park pathway infrastructure at the South East corner nearest to the grandstand in the exhibition grounds. From there the pathway would head south to South Parkside Drive at which point it would turn east along the north side of South Parkside Drive where a new pathway would be constructed. Where South Parkside Drive meets 43rd Street there is an existing traffic light which would be augmented to accommodate pedestrian and bicycle activity allowing for safe access to points east of 43rd. A composite is provided for the intersection at 43rd Street and South Parkside Drive demonstrating the proposed location of the bike path and augmented traffic signal.

Once past the crosswalk the pathway would turn north to bypass the property at that location and then head east through private lands.

9.3.1 Privately Held Lands

The first private land is a portion of the Lethbridge Research Station lands. East of this first intervening parcel is a site held by Dalton and David Howe. From there it would cross to the north side of the road and potentially continued east along the Bos Sod farmland until it comes to the SMRID canal.

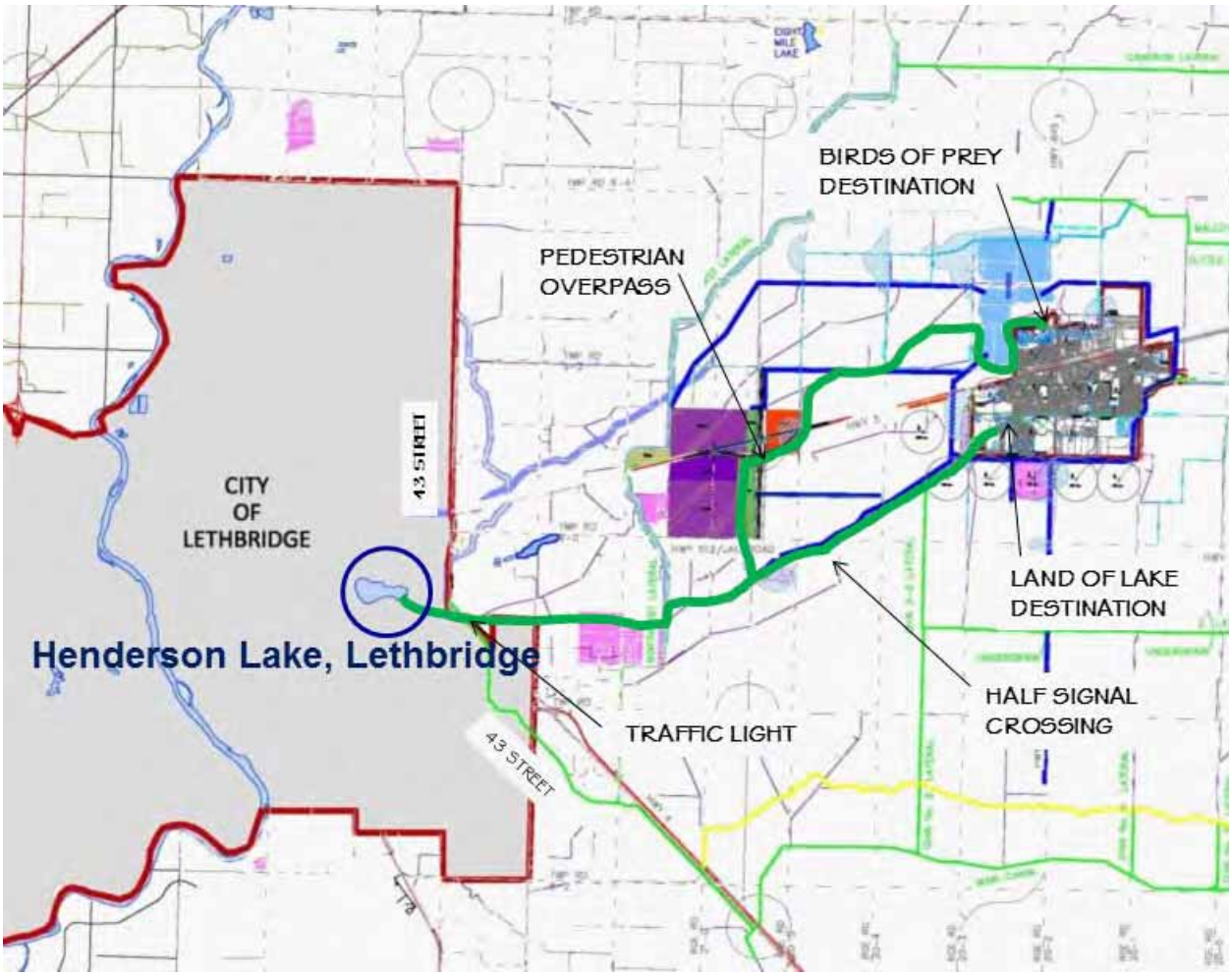
Local landowners of the private lands required for Regional Pathway Network continuity have been approached in a community consultation process in order to secure the interest and ensure that at a conceptual level there is no opposition or negative sentiment toward the pathway.

Immediately west of the St. Mary's River Irrigation District canal system where the pathway leaves the existing SMRID right-of-ways in order to find a more direct route towards Henderson Park the land abuts Terry Hamilton's property. Terry has indicated he is in favor of the bike path that it is not possible for to be accommodated on his land. In light of this consideration, Bos Sod has been approached to confirm that a right-of-way on the south edge of the Bos Sod property would be feasible.

Point at which the Regional Pathway would turn West from the Canal to Follow Private Lands

9.3.2 The SMRID Right-of-Way – Canal System

The Regional Pathway would then follow the canal north until it meets the south lateral drain of the SMRID system. Upgrading that is anticipated for the Canal would include armoring the canal and upgrading the SMRID service road. The service road would not be utilized as part of the pathway infrastructure and would be kept on the opposite bank of the canal from the pathway. Landscaping would be provided along the pathway to augment the aesthetic experience and to assist with absorbing excess water which would be pulled from the system in excessively wet years when a reduction in water volumes would be helpful. The minimum requirements of the respective planting would be provided via the natural run off during the dry and normal years.



9.3.3 The SMRID Right-of-Way - South Lateral

The South Lateral drain enters the south west corner of Coaldale and would connect to the infrastructure of the Land O Lakes Golf Course. Where the South Lateral intersects with Highway 512 a “half-signal” would be provided to allow for safe crossing and to ensure the safety of the pathway users.

Half-signal

Where the proposed pathway system would intersect with the new alignment of the Canamex corridor and additional pathway would head due north until it reaches Highway 3. At this point the new overpass would accommodate an ability for the pathway to continue onward in a north easterly direction again along and SMRID drain. This pathway would arrive at the Alberta Birds of Prey Centre in Coaldale.

9.3.4 Composites for Case Studies

Composites were created to demonstrate the potential for the proposed pathway alignment at each of the respective conditions along the path.

Composite A demonstrates the potential for the pathway along South Parkside Drive and the new crosswalk at 43rd St.

Composite B demonstrates the potential for the pathway system along the private lands between 43rd Street and the SMRID canal.

Composites C and D demonstrate the potential for the pathway along the SMRID canal system.

Composite E demonstrates the potential for the pathway along the South Lateral Drain of the SMRID.

Figure 1: Composite A - South Parkside Drive and the new crosswalk at 43rd Street

Figure 2: Composite B - Pathway system along private lands

Figure 3: Composite C - Pathway system along SMRID canal

Figure 4: Composite D - Pathway system along SMRID canal

Figure 5: Composite E - Pathway system along South Lateral SMRID Drain

9.3.5 Reducing the Carbon Footprint

One of the primary benefits of providing a regional pathway network that responds to alternative modes of transportation is reduction in the carbon footprint. While considerable inroads are being made for alternative fuels the great majority of vehicles being utilized by commuters are fossil fuels. Fossil fuels are by definition non-renewable fuel resources extracted from the ground and need to be conserved for future generations. Fossil fuels when burnt create carbon dioxide contributing to the greenhouse effect and some fuels when burnt create sulfur dioxide which in turn causes acid rain.

Utilizing bicycles as a mode of transportation eliminates the concerns associated with vehicular traffic in the context of air pollution both by not contributing to the air pollution and because the commuting cyclist is less exposed to air pollution and commuting motorist. Bicycling also contributes to overall health and well-being by reducing cholesterol levels in the blood, and increasing the high density lipoprotein – protein/cholesterol ratio in the blood. Bike riding reduces the chances of strokes, heart attacks and illness caused by high blood pressure, as well as contributing to many other health benefits. The benefits of walking and equestrian travel are similar in all respects.

9.3.6 Equestrian Opportunities

Throughout the course of the Community Consultation process a desire for an equestrian pathway network was requested by numerous stakeholders and residents. The study area has a substantial number of equestrian facilities such as the Rainbow Riding Centre, Don Toney's Dressage Arena, South 43rd Street Boarding Stables and Arena and many more. In addition many private landowners have horses and could benefit from an equestrian pathway network.

Equestrian pathways and pedestrian/bicycle pathways do not perform effectively when sharing the same travel path network and as such a dedicated and complementary equestrian path should be defined. This endeavor should be planned at stakeholder meetings held to strategize and determine optimized location and commitment.

9.3.7 Dedicated Pedestrian Pathway

As the activity and traffic on the pathway network increases a dedicated pedestrian path, directly adjacent and meandering alongside the asphalt bicycle path, should be provided. This pathway could be finished in limestone aggregate, or cedar mulch, both of which pack effectively while still providing a measure of cushion for walking and jogging. It is anticipated that this narrow walking trail would augment the asphalt path providing an alternative opportunity in areas where the bicycle traffic dominates the path.

9.3.8 Liability

The optimized means of managing the liability is to apply the same principles that presently manage our transportation networks in the public realm. In order to accomplish this mandate the lands associated with the pathway network should be defined in the context of a Right-Of-Way, whether they be across privately held lands, Irrigation District lands, or federal lands. This Right-Of-Way would have associated with it clarification of the legal aspects associated with liability.

9.3.9 Solid Waste Management

Solid waste generated en route between destinations by commuters and recreational users will be collected in public receptacles that will be managed similar to solid waste at rest stops along major corridors highways and roadways. It is anticipated that the existing infrastructure can be expanded to manage and address the needs associated with the Regional Pathway System.

9.3.10 Street Furniture

The Street furniture along the Regional Pathway System should include benches at rest areas along the way as well as gazebos to provide an opportunity for repose as well as interpreting points of interest with informational plaques describing unique features along the way. The gazebos and street furniture should be designed with a robust prairie architecture that is unique to the area contribute to regional signature style that will be identified with the region. One of the key elements that the region is becoming known for is the Alberta Birds of Prey Centre

In light of this consideration, a bird theme would effectively contribute to the uniqueness of the region.

9.4 Precedent

The town of Chestermere, east of Calgary, has as its primary attraction a 750 acre lake offering recreational programs and activities. Chestermere is connected to the Calgary bike path system which can be accessed at the south end of West Chestermere Drive. The pathway is constructed along the WID irrigation canal network and provides an opportunity for commuting and recreational activity.

Echo Dale Regional Park is located west of Medicine Hat and features two beautiful man-made lakes in a peaceful river valley setting with over 7 km of walking trails. One lake is chlorinated and treated like a swimming pool. Other water elements provide an opportunity for fishing and paddling. The park features a historic farm and the fully restored Woolfrey house which offers a glimpse of what life was like in the early settler days. Medicine Hat has a network of 92 km of trails winding through the city and connecting many parks with abundant natural environment along creeks and rivers to the City Medicine Hat. The pathway when it was constructed with surgically introduced into its crested wheat grass setting without damaging the immediately surrounding terrain.

9.5 Anticipated Project Costs

Capital costs associated with the Regional Pathway System are in the order of $76,000.00 per kilometre for an 8' wide pathway consisting of 2" of asphalt paving on a 6" aggregate base. (Costs are based on RS Means Assembly's Cost Data 2012) Street furniture capital costs would be in the order of $5,000.00 per kilometre, shelters would be in the order of $25,000.00 per kilometre, and landscaping in the order of $20,000.00 per kilometre, all contingent on volume.

The total length of the regional pathway system has been divided into 2 sections:

South Trail (from Lethbridge to Coaldale) = 11.14 km

North Trail (branches off the south trail to the Birds of Prey Centre) = 10.32 km

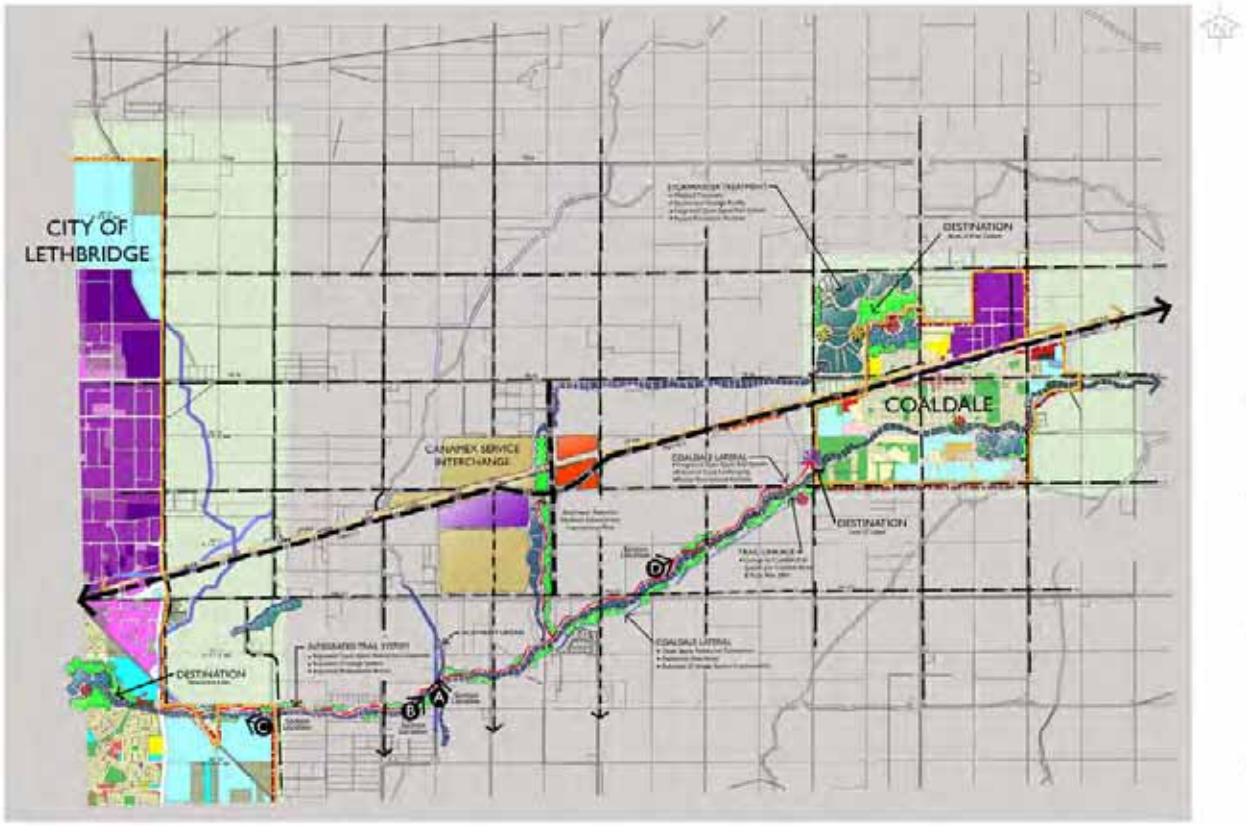
It is anticipated that a maintenance and life cycle program and protocol would be developed in a context of the County of Lethbridge and Town of Coaldale maintenance programs as the SMRID has indicated that they will not be able to contribute on the actual pathway and solid waste management aspects of the project.

10.0 Open Space Planning

10.1 Introduction

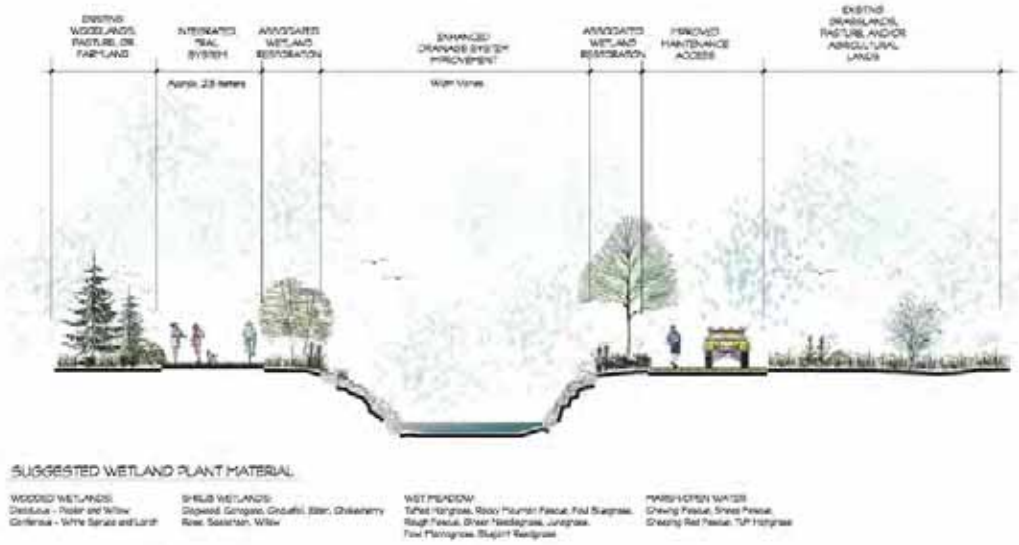
The County of Lethbridge and Town of Coaldale Integrated Development Strategy provides for an inter-municipal progressive storm water management strategy that will assist in both the immediate and long term solution to flooding within the region. A secondary benefit to the storm water management plan will be the incorporation of an open space planning component that provides for enhanced linear wetland development and the provision of an important pedestrian link between the communities of Lethbridge and Coaldale.

The primary regional pathway alignment (east/west link) is proposed adjacent to the SMRID South Coaldale lateral drainage swale, to lead from a point of connection to the Henderson Lake destination point in Lethbridge to the Land O' Lakes destination point in south Coaldale(see figure below). A proposed north leg of the alignment takes the pathway through the Broxburn Industrial area and Canamex Corridor/Highway 3 interface and connects with the Birds of Prey Centre destination point in north Coaldale. Pathway connections within the Town of Coaldale will respect the 2011 Coaldale Parks & Trail Plan.



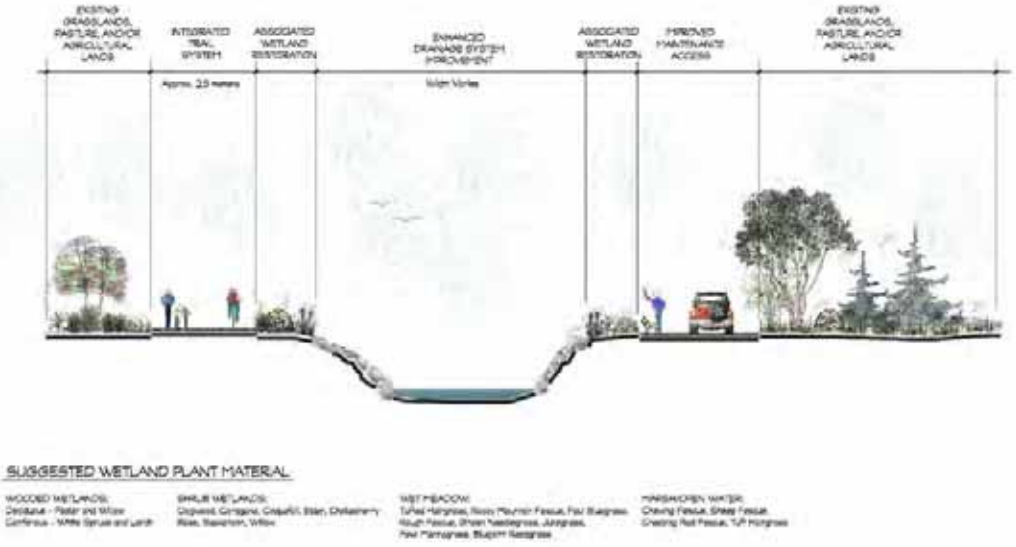
This graphic illustrates the conceptual pathway connection between Lethbridge and Coaldale. Each of the graphic pathway section A-D locations are identified for reference.

Further, the open space trail network will ultimately be a part of a larger proposed landscape enhancement program including regrading and drainage improvements(south Coaldale lateral), erosion protection(rock/rip-rap), landscape improvements and linear wetland development(planting/native grasses), rest areas(site furnishings/fixtures), maintenance access improvements and hard surface pathway development. (See sections A,B,C, & D)



Integrated Trail System Section 'A'

Not to Scale



Integrated Trail System Section 'B'

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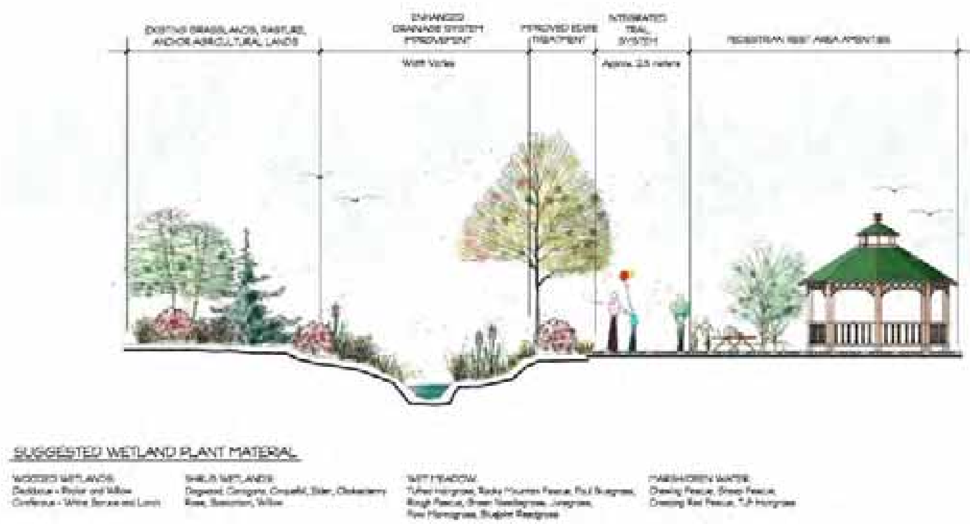

Integrated Trail System Section 'C'

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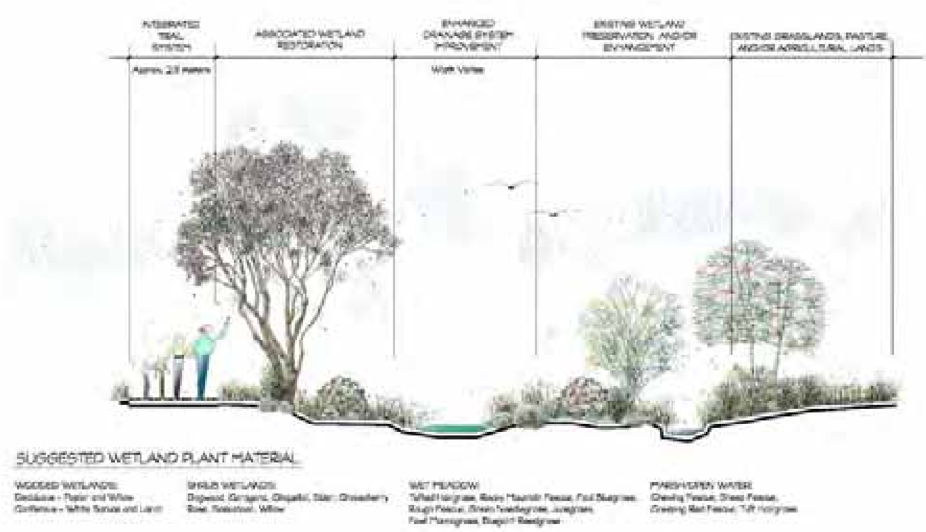


Integrated Trail System Section 'D'

Not to Scale

10.2 Design Principles

The design principles associated with open space/path network include:

Principle #1

- To provide a regional path/pedestrian connection between the communities of Lethbridge and Coaldale for walking, biking and jogging.

Principle #2

- To provide a 'commuter type' regional pathway system that would encourage potential commuter activity between the two urban centres and reduce pedestrian/vehicle conflicts. This regional path connector will be constructed as a hard surface suitable for cycling and pedestrian use. The pathway will be located and provide public access along the SMRID canal network from Lethbridge to Coaldale.

Principle #3

- To provide public access and connection between the two urban centres and intermediate access to the industrial/commercial development areas (eg: Broxburn Industrial Park). These connections will further encourage commuter activity as cited above.

Principle #4

- To ensure a compatible interface between the regional pathway network and the SMRID canal system and the surrounding rural/agricultural lands. Details surrounding exact pathway alignment, surfacing, garbage containment and collection, liability, canal crossings, signage and fencing etc. would be subject to much further review and refinement with the proper authorities at the municipality, town and the SMRID.

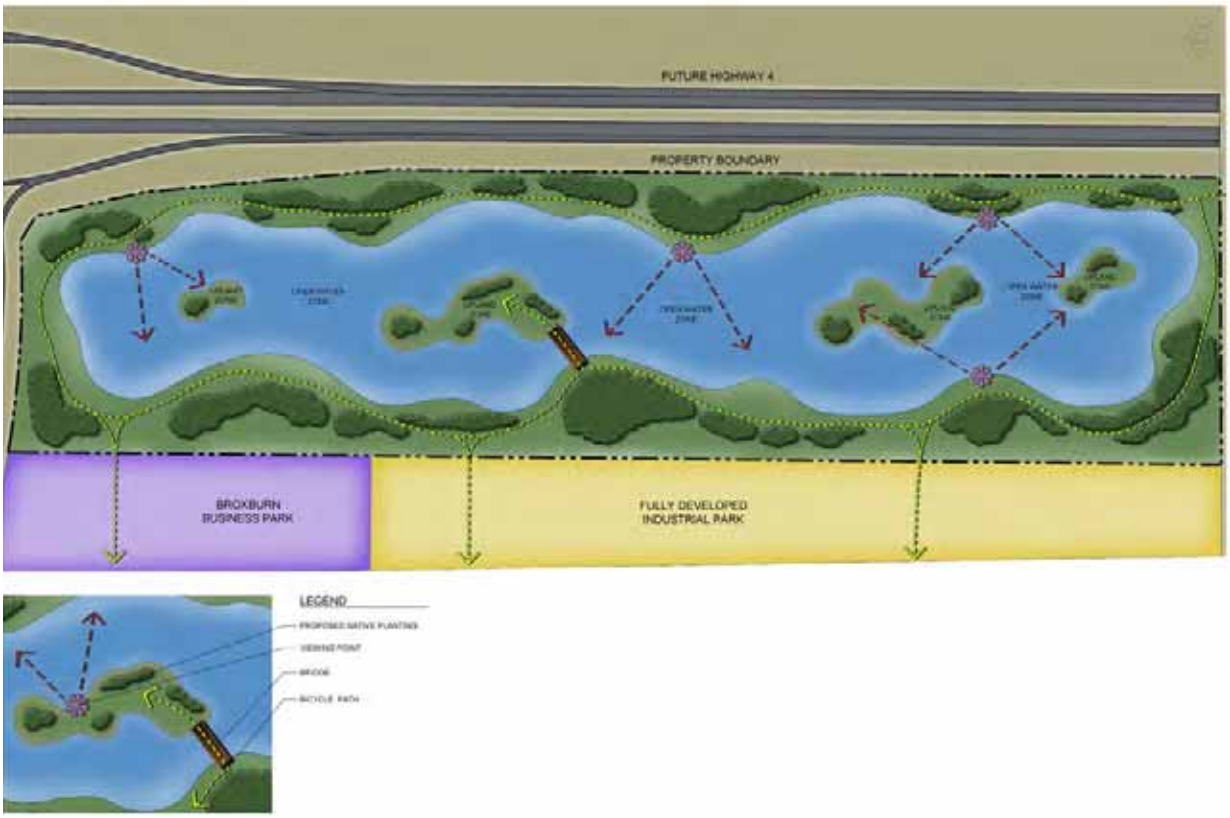
Principle #5

- To improve user safety by reducing pedestrian or cyclist and vehicle conflicts particularly along Highway 3 and other secondary highway arteries that pedestrian/cyclists have had to use in the absence of any regional path system. Safety will also be improved through the proposed installation of a pedestrian overpass crossing (Highway 3/Canamex corridor interchange) and the proposed 'half-signal' pedestrian crossing where the regional pathway crosses 43rd street in Lethbridge leading to the Henderson Lake destination.

10.2.1 Linear Wetlands creation and enhancement

The open space system including pathway network and linear wetlands development, within the study area, will highlight and enhance the environmental characteristics of the site.

Environmental restoration and enhancement are the guiding principles of the design of the open space/ regional pathway system and the potential location and alignment for linear wetlands and storm water retention facilities(see Figure below).



The graphic illustrates a conceptual stormwater retention and wetland enhancement area with pedestrian and bicycle access.

Environmental characteristics and components of the design will include rehabilitation of existing drainage courses through the lands historically used for grazing and agriculture(south Coaldale lateral), preservation and re-establishment of significant plant species(eg: prairie grasses, willows), landscape enhancement using native vegetation and reduced irrigation, and restoration and creation of linear wetland facilities in conjunction with sound planning to ensure compatibility with surrounding rural/agricultural land uses.

Suggested seed/planting mixes and species for these created zones are proposed as follows:

Upland Zone – Drill seed @ 7-8 lb/1000 sq.ft.

- 30% Chewings Fescue
- 30% Sheep Fescue
- 30% Creeping Red Fescue
- 10% Tufted Hairgrass

Wet Meadow – Broadcast seed @ 60lb/ac

- 30% Tufted Hairgrass
- 15% Slough Grass

- 05% Tall Mannagrass
- 05% Fowl Mannagrass
- 15% Nuttall's Alkali Grass
- 21% Fowl Bluegrass
- 05 % Canada Reedgrass
- 02% Rush
- 02% Sedge

Shallow Marsh Mix – Broadcast seed @ 50 lb/ac

- 10% Spike Rush
- 10% Baltic Rush
- 10% Beaked Sedge
- 10% Water Sedge
- 05% Cattails
- 25% Fowl Bluegrass
- 30% Tufted Hairgrass

Deep Marsh/Open Water – Broadcast seed @ 30lb/ac

- 30% Cattail
- 30% Water Sedge
- 10% Rush
- 15% Bulrush
- 15% Alkali Bulrush

10.3 Implementation and Maintenance

Open space elements (ie: linear wetlands, pathways, landscape enhancements etc.) will be incorporated with each stage of the storm water development plan process in a manner which minimizes capital cost expenditures and ongoing maintenance costs to the municipality and town.

The open space system and its development and management structure all have to be designed to be supportable over time. This will be accomplished through utilization and incorporation of native plant/grass species, drought resistant plantings, use of durable, recycled materials (eg: recycled asphalt) and improved maintenance design practices.

It is anticipated that the open space system will be comprised of a combination of lands either dedicated to the municipality or purchased and lands retained by the SMRID but provided for as public access.

11.0 Architectural Form and Character

11.1 Prairie Architecture

"Prairie Architecture" has developed into a recognized style in North America. The roots of the Prairie Style are in the Midwestern United States in the late 19th and early 20th centuries. The Prairie school developed in sympathy with the ideals and design aesthetics of the Arts and Crafts movement begun in the late 19th century in England Architects such as Jon Ruskin and William Morris. The ideas were further developed by the Chicago group by architects such as Marian Mahoney and the term was first coined by Allen Brooks an architectural historian. Frank Lloyd Wright is the most famous proponent with the greatest influence on the style. He promoted an idea of organic architecture where the primary tenant was that the structure should look as if it grew naturally from the site. Wright felt that a horizontal orientation was a distinctly North American design motif and a new idea for a new continent.

11.2 Regional Distinction

Over the years regional distinctions have developed in the style and at this point we are promoting a unique and individualized context of Prairie Architecture for the area of the IDS. The basis of Southern Alberta Prairie Architecture should be born out of its architectural history which began with wooden palisade architecture precedent such as Fort MacLeod and Fort Whoop-up. In the late 1800s and early 1900s masonry structures began to appear and it is an amalgamation of the low roof pitch and the horizontal elements of the Prairie style with a more massive and robust beam configuration that is appropriate for the Gateway to Canada.

11.3 Canadiana Architecture

Canadiana Architecture is also an identifiable style in North America. Typically expressed in a mountain rock base with log detailing and log gables. The style has been reinterpreted in a modern context at the Alberta Tourist Information Center in West Glacier, Montana. The project has a very robust mountain rock base with log detailing at the entry canopy and provides a horizontal window element below the eave creating a very distinctive Canadian style.

11.4 Gateway Opportunity

Since the IDS study area is first major stop across the border on the Canamex corridor it would be appropriate to utilize a reinterpreted Prairie Style Architecture that has a distinctive Canadiana context in an identifiable style to provide a cohesive architectural canvas for a unique region. This architectural style would be marketable creating an attraction for travelers from international destinations.

11.5 Gateway Architecture Summarized

To summarize the Architectural Form and Character the following are key criteria: The design should be marked by horizontal lines with flat or low pitched hipped roofs with broad overhanging eaves. Windows should be grouped in horizontal bands and the lines of other materials on the buildings should also augment these horizontal lines. A solid rock base of random coursed ashlar masonry with a linear transition to window and roof are essential elements that should be readily identifiable elements for the style of development in the region.

The design should be distinct from Prairie Architecture in so far as it harkens back to the local Alberta historical architecture however reinterpreted in a Prairie tradition. It should be distinct from Canadiana in that rather than utilizing peeled logs, which would be the norm, dressed heavy timber beams should be provided to create this unique style. Canadiana also typically has a steep roof pitch which has become associated with Alpine Architecture, in lieu of the steep pitches it is recommended that the low pitch expansive roofs again provide a distinction from Canadiana to the dedicated design style for this region.

12.0 Biophysical Overview and Data Summary

Executive Summary

Westhoff Engineering Resources, Inc. (Westhoff) was retained as a member of the Integrated Development Strategy (IDS) consulting team to compile biophysical information with consideration for future land use and development within the Lethbridge/Coaldale corridor. Of particular interest are biophysical features and/or landscapes that may be considered environmentally sensitive or significant. The regulatory framework applicable to future land use and development within the Lethbridge/Coaldale corridor includes municipal, provincial and federal legislation that protects these biophysical features. We provide a brief description of this regulatory framework.

We performed a high-level search of existing information to describe the biophysical features of an identified Environmental Study Area that encompasses the Lethbridge/Coaldale corridor. This high-level biophysical overview provides a general indication of existing biophysical conditions, specifically:

1. the general types of land use and development;
2. the types of soils, terrain and plant communities;
3. the limited availability of natural habitat areas;
4. the diversity of known and potential plant and wildlife species; and,
5. the number of potential rare and/or sensitive species and communities.

We recommend further biophysical assessment efforts to confirm the presence of environmentally sensitive and/or significant features within the Study Area that include further data review, detailed vegetation/ecological community mapping, assessment of impacts and identification of mitigation measures. These further efforts may be applied in a phased approach, and on a site-specific basis to support of future land use planning initiatives.

12.1 Introduction

In response to the issue of recurrent flooding in the County of Lethbridge and Town of Coaldale, and the resulting impacts to land development, the County and the Town are developing a comprehensive Integrated Development Strategy (IDS). The IDS will provide a long-term, overarching vision for land use within the Lethbridge/Coaldale corridor and set strategies aimed at maximizing servicing efficiencies, protecting the environment, and pursuing economic development opportunities.

Westhoff Engineering Resources, Inc. (Westhoff) was retained as a member of the IDS consulting team to compile biophysical information with consideration for future land use and development within the Environmental Study Area. Of particular interest are biophysical features and/or landscapes that may be considered environmentally sensitive or significant. Such features may include unique landforms, areas of important wildlife habitat, large natural areas, riparian lands, or known locations of elements of conservation concern, such as plant or wildlife species with federal and/or provincial conservation status.

There are several key municipal, provincial and federal Acts and associated regulations that provide legal protection and management direction for biophysical features that may be considered sensitive or significant.

Certain relevant federal regulatory statutes include:

- *the Fisheries Act*, which regulates impacts on fish and fish habitat associated with works, undertakings, operations and activities occurring in or around fresh water;
- *the Migratory Birds Convention Act*, which protects most migrating birds found in Canada and prohibits anyone from killing, harming or harassing migratory birds, their nests or negatively affecting the water quality of habi-

tat frequented by migratory birds; and,

- *the Species at Risk Act*, which provides protection to prevent Canadian indigenous species, subspecies and distinct populations from becoming extirpated or extinct, and provides for the recovery of endangered or threatened species by prohibiting the killing, harming or harassing of endangered/threatened species and damage to their residence.

Relevant provincial legislation includes:

- *the Water Act*, which asserts the provincial Crown's ownership of all water in the province, including wetlands. The Crown reserves the right to divert or generally disturb water, except through statutory authorization;
- *the Public Lands Act*, which supports the orderly development and use of public land, as well as prohibiting the deliberate damage to public land; and,
- *the Wildlife Act*, which prohibits any activity on either public or private land that could harm a nest or den of prescribed wildlife (including endangered wildlife, migratory birds, snakes and bats).

The ***Municipal Government Act*** is the main Alberta statute that governs how municipalities engage in land use management, including the conservation and/or protection of identified environmentally sensitive of significant features.

12.2 Methods

We prepared a high-level overview of the biophysical features of the Study Area including any features that may be considered environmentally sensitive or significant. We prepared this overview with consideration for the above regulatory framework and its influence on future land use planning within the Study Area.

A broad Environmental Study Area (Study Area) was defined inclusive of the full potential footprint for future land use and infrastructure development in the region, as per the IDS. For this area, we compiled available spatial data layers supplied by the County of Lethbridge that include data on roads and developments, hydrology, contours, soils, and land cover, as well as aerial photographs.

We compiled information on elements of conservation concern with reference to available databases. An ACIMS (Alberta Conservation Information Management System) database search was completed to reveal any potential wildlife, fish or plant species, or rare ecological communities that have the potential to occur on or in the vicinity of the Study. ACIMS is a provincial government organization that tracks information on species, communities and sites of conservation interest or concern (Government of Alberta, 2009a). The ACIMS database search also provided information on known occurrences of special status plants and rare ecological communities within or adjacent to the Study Area.

Data on wildlife of the Study Area was compiled from several additional sources. We reviewed Alberta wildlife field guides (McGillivray and Semenchuk, 1998; Semenchuk, 1992; Pattie and Fisher, 1999; Stebbins, 2003; Russell and Bauer, 2000; ASRD, 2005 and 2010) to describe the overall diversity of wildlife species that may potentially inhabit the region. We also completed a search of the provincial FWIMS (Fisheries and Wildlife Management Information System) database to determine whether any wildlife species that have been observed within the Study Area that are federally-listed as Species At Risk under the Species At Risk Act (SARA) (Government of Canada, 2002), identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or provincially identified as Sensitive, May Be At Risk or At Risk as per the General Status of Alberta Wild Species (ASRD, 2005).

ACIMS also identifies Environmentally Significant Areas (ESAs) in Alberta based on their important and/or unique environmental values vital to the long-term maintenance of biodiversity and ecological processes and services within a region. We accessed an ESA map available through ACIMS which was prepared as part of an evaluation of ESAs (Fiera Biological Consulting, 2009) to determine whether there are any known ESAs within the Study Area.

Wetlands may also be considered significant landscape features. In general, the protection of wetlands is regulated by Alberta Environment and any activity that may impact a wetland requires an approval under the Water Act. Alberta Environment, with technical support from Ducks Unlimited Canada (DUC), developed a provincial wetland inventory under the Province's Water for Life strategy. The wetland inventory uses current and historic aerial photographs to assess the distribution and extent of wetlands over time. We inquired of DUC as to the availability of wetland inventory data for the Study Area. Other sources of information on wetlands and the distribution of

other vegetation communities came from a review of available digitals maps provided by the County of Lethbridge.

12.3 Results

Table 1 presents a summary of the available biophysical data compiled for the Study Area (Appendix A). Included are the sources for the available data as well as the potential applications, limitations and possible follow-up requirements needed to adequately assess the environmental sensitivities of the Study Area in response to proposed land use. A brief description of this data is summarized below.

12.3.1 Natural Regions and Subregions

A map of the Natural Regions and Subregions of Alberta is provided in Appendix B. Prepared by the Natural Regions Committee (2006), this map and associated reporting provides a description of the natural biophysical conditions represented within the landscape based on climate, topography, parent materials and biotic elements, exclusive of changes resulting from recent land use and development.

The Study Area falls primarily within the Grassland Region and specifically, the Mixedgrass Natural Subregion. The Subregion is characterized by undulating and hummocky till plains, level lake areas, and undulating to hummocky sand/clay deposits. Needle-and-thread grass (Hesperostipa comate), porcupine grass (Hesperostipa spartea), and northern and western wheatgrasses (Elymus lanceolatus and Pascopyrum smithii) form communities on average sites in remnant prairie areas. Moister conditions on higher areas within the Subregion allow plains rough fescue (Festuca hallii) or bluebunch fescue (Festuca idahoensis) to become dominant. Overall, this map provides an indication of the typical environment conditions expected within portions of the Study Area that remain under natural conditions.

12.3.2 Base Map

We developed a base map with spatial data provided by the County of Lethbridge, which includes orthophotos, contour data, land use information (roads, developments, other existing infrastructure), and hydrology (rivers, lakes, wetland, and irrigation) (Appendix C). Agriculture remains the main industry in the area and consists of a mixture of crop and livestock production. Much of the land base in the County is being used for this purpose. Other industries include transportation, construction, manufacturing and food processing (County of Lethbridge, 2009). The aerial photographs (orthophotos) also reveal that a considerable portion of the Study Area has been modified through long-term agricultural practices, in particular cultivation.

The base map reveals the location of the Study Area in relation to hydrological landscape features. In general, the IDS encompasses the drainage area known as the Malloy Drain, located east of the City of Lethbridge, in Lethbridge County, and is centered on the Town of Coaldale. The area, approximately 217 km2, is bounded to the north by Township Road 9-4, to the east by Stafford Reservoir at Range Road 182, to the south by the SMRID main Canal at Township Road 82 and to the west by the City of Lethbridge city limits at approximately 43rd Street N (Highway 843). Runoff from snowmelt and rainfall events drains primarily through a series of natural and constructed channels that form the backbone of the Saint Mary River Irrigation District (SMRID) infrastructure in the region. Due to its low-lying location, flow is concentrated in the Coaldale region before draining to Malloy Lake then to Stafford Reservoir to the east through SMRID canals and roadside ditches.

Available contour data, as presented on the base map, shows that the terrain of the Study Area generally consists of undulating plains with some rolling to hummocky areas. Lethbridge is at the highest point of land, which then gradually slopes down towards Coaldale. The steep slopes of the Oldman River valley are the most prominent terrain feature in the area.

12.3.3 Soil Map

A soils map is also available from the County of Lethbridge (Appendix D). The map reveals that the majority of the Study Area consists of Orthic Dark Brown Chernozemic soils, with a portion of the Study Area southwest of Coaldale represented by Orthic Humic Gleysol.

12.3.4 Land Cover Map

The County of Lethbridge also provided a land cover map (Appendix E), which presents information on vegetation communities and also reveals the extent of cultivation within the Study Area. Remnant native grasslands appear to exist primarily adjacent to the Stafford Reservoir and along the Oldman River Valley, with only small scattered patches occurring within the central portion of the Study Area. A number of wetlands are also identified.

12.3.5 Potential Special Status Plants, and Rare Ecological Communities

To gain an understanding of the potential for special status plants or rare ecological communities, we prepared lists of these elements of conservation concern with reference to available data from ACIMS. We conducted an ACIMS database search to identify any special status plants or rare ecological communities that have the potential to be encountered within the Study Area. These database searches provide lists of special status plant species by Natural Subregion and lists of rare ecological communities by Natural Region. These lists are not specific to the Study Area but provide an indication of the number of special status plants and rare ecological communities that may be present in the same geographic region. The results of the ACIMS database searches are presented in Appendix F, including scientific names.

For special status plants, we compiled a list of up to 66 with the potential to occur in the Study Area, of which 5 are federally listed species:

- Dwarf Woollyheads
- Hare-footed Locoweed
- Smooth Narrow-leaved Goosefoot
- Soapweed
- Western Blue Flag

Up to 7 rare ecological communities have the potential to occur within the Study Area.

12.3.6 Potential Wildlife and Fish Species

We prepared a list of bird, mammal, amphibian, and reptile species that may occur within the Study Area based on current species distributions (Appendix G). Over 200 wildlife species have the potential to occur in the Study Area. Habitat for certain species may be limited in light or the degree of habitat alternation and disturbance resulting from cultivation and other land uses. Of these 200 species, 18 are federally-listed by COSEWIC and SARA as Endangered, Threatened, or Special Concern. A total of 63 are provincially identified as At Risk, May be At Risk, or Sensitive as per the General Status of Alberta Wild Species (ASRD, 2005).

12.3.7 Observed Federally-listed and Provincially-identified Wildlife and Fish Species

Information on known occurrences of federally-listed or provincially-identified species came from ACIMS spatial shapefiles (Appendix G) (Government of Alberta, 2009b), and ESA mapping and report downloaded from the ACIMS website (Appendix H) (Fiera Biological Consulting, 2009). The ACIMS shapefiles present the locations of special status plants and/or rare ecological communities while the ESA map identifies whole areas where multiple species of concern have been located, including plants and wildlife.

ACIMS special status plants and rare community observations as well as ESA locations in the Study Area are presented in Appendix I. The ESA areas are represented as green polygons on the map. The ACIMS data is represented as red polygons of variable shapes or as orange Townships. Red polygons identify rare plant species or rare ecological communities considered “non-sensitive element occurrences”, for which there are no restrictions regarding public access to the location data. The size of the circle reflects the level of accuracy in pin-pointing the location of the observation. The orange Townships identify “sensitive element occurrences”, for which the location is not freely available to the public.

There are 2 records of plant species of conservation concern located within the Study Area (Appendix I). An observation of Picradeniopsis, (provincially-identified as “May be At Risk”), was made in 1940, at a location southeast of Coaldale. An observation of side oats gramma (ranked as S1: critically imperiled) was made in 1955, at a location east of Lethbridge. The S-ranking system applied to side oats gramma was developed by NatureServe, a non-profit conservation group, and as such, is not a legal description but rather a separate assessment of species status. Both

of these observations are relatively old and whether these species still exist at these locations is unknown. Numerous other observations of special status plants and/or rare ecological communities are recorded at sites just outside the boundary of the Study Area, primarily along the Oldman River Valley.

There are 2 ESAs of national significance: #291 and #294, located on the western and northern boundaries of the Study Area (Appendix I). Both ESAs encompass portions of the Oldman River Valley and include natural areas representative of the Natural Subregion. Observations have been recorded in these 2 ESAs of approximately 42 elements of conservation concern including amphibians, birds, fish, insects, mammals, vascular plants, and rare ecological communities. They both provide important wildlife habitat including habitat for focal species (in this case Ferruginous Hawk (Buteo regalis), and Western burrowing owl (Athene cunicularia hypugaea).

FWIMS database results were not readily available in shapefile format for the purpose of presenting information in this report. Our FWIMS database search confirmed known occurrences of 24 wildlife species of special conservation concern within the Study Area, including 7 species identified under the General Status of Alberta Wild Species (ASRD, 2005) as (Appendix G):

- At Risk: Northern Leopard Frog, Ferruginous Hawk and Burrowing Owl; and,
- May be At Risk: Plains Spadefoot Toad, Prairie Rattlesnake, Short-eared Owl and Long-tailed Weasel.

All 3 At Risk species as well as observations of Prairie Rattlesnake were located within the core portion of the Study Area.

Data on fish species known to occur within the Study Area came from the FWIMS interactive mapping site, which presents data derived from field surveys of waterbodies in the region. A total of 36 fish species are known to occur within the Study Area, of which 7 have provincial and/or federal status (Appendix G):

- Bull trout
- Cutthroat trout
- Lake sturgeon
- Lake trout
- Rainbow trout
- Sauger
- Spoonhead skuplin

These fish species were observed in the Oldman River, CPR Lake, Stafford Reservoir, McQuillan Reservoir, and Henderson Lake; however, the greater diversity of species was found in the Oldman River.

Overall, the ACIMS and FWIMS databases of observations should not be interpreted as evidence to suggest the absence of species and/or communities of conservation concern. Many areas in Alberta have never been comprehensively surveyed, and an ACMIS or FWIMS data search is not intended as a final statement on the presence, absence, or condition of such elements of conservation concern in a given area. Further field inventories would be required to more accurately detect such elements within the Study Area.

Given these limitations, however, we anticipate the majority of species of special conservation concern are likely to be associated with relatively more natural environments, sites which, based on current Land Cover mapping, are in limited supply within the Study Area. We expect that most species of special conservation concern are more likely to occur in the Oldman River Valley, outside the primary Study Area.

12.3.8 Wetlands

As indicated above, wetlands may also be considered significant landscape features. We inquired of DUC as to the availability of wetland inventory data for the Study Area. No DUC inventory data is available for the Study Area. The Land Cover map provided by Lethbridge County shows a number of identified wetlands. In Alberta, any impacts to wetlands resulting from proposed development require an approval under the Water Act. Site-specific field inventories of the Study Area would be required to confirm whether any proposed future development overlaps with existing wetlands and would trigger the *Water Act.*

12.4 Next Steps

This high-level biophysical overview provides a general indication of existing biophysical conditions within the Coaldale/Lethbridge corridor and surrounding area, specifically:

1. the general types of land use and development;
2. the types of soils, terrain and plant communities;
3. the limited availability of natural habitat areas;
4. the diversity of known and potential plant and wildlife species; and,
5. the number of potential rare and/or sensitive species and communities.

Further efforts are required to confirm the presence of environmentally sensitive and/or significant features within Study Area, such as special status plants and sensitive wildlife, and/or suitable habitats to support these species. The following additional efforts are recommended to confirm the presence of these features and to provide data in support of future land use planning initiatives. A phased approach may be applied that is sensitive to phases in creation of the Integrated Development Strategy for the Lethbridge/Coaldale corridor.

- **Further Data Review.** We recommend a more in-depth review and evaluation of the available data presented in this Letter to provide further confirmation of the probability of occurrence of identified species and communities of conservation concern.
- **Vegetation/Ecological Community Mapping.** At this stage, we present the land cover map separately and have not integrated this information into the base map. The rationale for doing so is that we are uncertain whether this land cover map accurately reflects current conditions within the Study Area. A comprehensive interpretation of aerial photographs and/or ground-truthing of map polygons is recommended to confirm the accuracy of the land cover map. Once confirmed, the land cover map may be applied in land use planning initiatives, such as the identification of available habitats for special status plants or wildlife with conservation status, possibly though the application of Habitat Suitability Index (HSI) Models. This further evaluation of available mapping will also facilitate the identification of any additional wetlands or other waterbodies subject to prohibitions under the Water Act.
- **Assessment of Impacts:** Once vegetation community and associated habitat suitability mapping is completed, we recommend an assessment of impacts of proposed infrastructure and development on any identified environmentally sensitive and/or significant features within the core Study Area.
- **Identification of Mitigation Measures:** Mitigation measures are measures applied to eliminate, reduce, or control the predicted negative impacts of a particular project or development. We recommend the identification of mitigation measures that could eliminate, reduce or control any predicted negative impacts of infrastructure and development on environmentally sensitive and/or significant features within the core Study Area, facilitating compliance with relevant federal, provincial and municipal environmental regulations.

Appendices

Appendix K_1	Summary Table of Biophysical Information
Appendix K_2	Natural Regions and Subregions of Alberta
Appendix K_3	Base Map
Appendix K_4	Soils Map
Appendix K_5	Land Cover Map
Appendix K_6	Potential and Observed Special Status Plants, and Rare Ecological, Communities, Within or Adja cent to the Study Area
Appendix K_7	Potential and Observed Wildlife and Fish Species Within or Adjacent to the Study Area
Appendix K_8	Environmentally Significant Areas in the Study Area
Appendix K_9	Rare Plant, Rare Community and Environmentally Significant Areas Map

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Appendix A - Firm Profiles

Coordination Team

Placemakers

Placemakers Inc. is a creative design company with a core competency in urban design and town planning. Based in Calgary, Alberta they practice throughout North America as experts in sustainable urbanism; the design of walkable, compact, mixed-use places; and the implementation of progressive form-based codes and alternative land-use regulation. Their clients include municipalities, developers, planning and engineering firms, and architects. They are a principled firm that delivers value to their clients with solutions built on time-tested principles, progressive design, and pragmatic implementation techniques.

They understand the challenges facing communities, especially in uncertain times, to be complex but interrelated, so they advocate comprehensive solutions, particularly with regard to land use regulation. Effective land use policy requires the integration of planning for infrastructure, environmental protection, transportation options, affordability, and other issues. Unfortunately, traditional approaches to defining and implementing policy are usually silo-bound. Conventional zoning, for instance, institutionalizes disconnects by consciously segregating places according to building uses and by unconsciously separating people by income, class, and age. Changing policy is not just a matter of changing words in ordinances and lines on maps; it's about changing minds, as well, and about giving decision makers and the citizens they represent the confidence to follow-through on bold planning for a new kind of future. Comprehensive strategies that address such a broad range of ambitions require a broad range of skill sets which is how PlaceMakers distinguishes itself.

They enjoy a top-tier reputation for their coding work, as you'll see from the projects outlined in this proposal. They are committed to producing inspiring plans and codes, but are even more committed to seeing them realized. With this commitment in mind, they shape their approaches to broaden support for the project as it evolves. They offer inclusive outreach efforts with substantial PR and Web support leading into a collaborative charrette. They are pioneers, in fact, at integrating all the components of a collaborative process: Pre-charrette workshops, Web communications, media relations, charrette planning and staging, and implementation training. PlaceMakers members have worked as public and private planners, as architects on public and private projects, with for-profit and non-profit developers, as real estate and business consultants in marketing and communications, and as college instructors.

D.A. Watt Consulting

D.A. Watt Consulting is a multi-disciplinary practice of civil and transportation engineers, land surveyors and geomatics professionals who have been providing transportation, municipal and land development services from their Calgary head office since 1983.

Their services include transportation and civil engineering design, transportation planning, contract administration, construction management, stormwater management studies, traffic engineering services construction and legal surveys, GIS mapping and geospacial information management. Their staff of 60+ includes professional engineers and Alberta land surveyors, GIS cartographers, engineering and legal surveyors, civil technologists and construction supervisors. They have extensive in-house experience in all aspect of civil engineering design and construction, material control and project management.

The size of the company allows their Managers, Civil Engineers and Land Surveyors to be accessible and personally involved with their clients and client projects. They strive to provide each client with the highest level of technical and professional service.

They are bringing their expertise in transportation planning and traffic engineering as well as knowledge of the area in support of the study team as their role will centre on long term transportation network planning.

Westhoff Engineering Resources Inc.

Since 1996, Westhoff Engineering Resources, Inc. has provided its clients planning and engineering solutions for water resources management and development projects throughout Canada and overseas. Westhoff is led by founder and chief engineer Dennis Westhoff, M.Eng., P.Eng., who has over 30 years experience in land and water resources management. This Calgary-based company has grown to include team leaders in engineering and environmental specialties with supporting team members that specialize in civil engineering (specialized in water resources), computer modelling, Low Impact Development, Best Management Practices (BMPs), structural design, watershed management, biology, field assessments, water quality, environmental planning, and graphics design.

The engineering and environmental services for projects span from concept to planning and design, construction and inspections to auditing and monitoring. Westhoff's multidisciplinary team turns water and environmental constraints into opportunities for their clients through the application of holistic approaches.

ENGINEERING	Municipal: stormwater management; constructed wetlands; Best Management Practices (BMPs) and Low Impact Development (LID) strategies; wastewater collection and treatment systems; water supply, treatment and distribution
	Rivers and Creeks: in-stream flow studies; floodplain mapping; hydraulic and hydrologic analysis; design and construction of bank stabilization techniques; bioengineering
	Hydraulic Structures: design of pump stations, dams and culverts
	Sustainability & Innovation: design of green roofs; rainwater harvesting; bioswales and bio-retention areas
	Computer Modelling: for stormwater management and river engineering
ENVIRONMENTAL PLANNING & ASSESSMENT	Biophysical Impact Assessments: planning, field studies, analysis, reporting
	Wetland Impact and Functional Assessments: planning, field studies, analysis, reporting
	Monitoring: creation of monitoring parameters, field monitoring, reporting
	Environmental Planning: watershed management, ecological planning approaches, environmental constraints mapping
CONSTRUCTION MANAGEMENT & FIELD SERVICES	Environmental & Construction Operations (ECO) Plans
	Erosion and Sediment Control (ESC) Plans
	Contract Documents: tender and award
	Construction Supervision and Administration
	Field Inspections: conducted by licensed professionals
	Environmental & Engineering Monitoring
REGULATORY & POLICY DEVELOPMENT	Policy Development: Low Impact Development (LID); Best Management Practices (BMPs); wetland and riparian conservation
	Approvals, Licenses & Permits: preparation of applications and facilitation of approvals
	Regulatory Compliance: auditing and review
	Wetland Compensation Facilitation
	Monitoring Reports: to meet regulatory approvals
	Hearing Preparation: studies, research, and regulatory strategy
	Expert Witness: forensic hydrology

STAKEHOLDER ENGAGEMENT	Public Consultation: planning, open houses, information packages
	First Nations
	SMART Workshops
GRAPHIC DESIGN & DRAFTING	Graphical Information Systems (GIS) and Arcview Applications
	Engineering and Environmental Design Drawings: conceptual to as-builts

Canadian Clean Water Technologies Inc.

Canadian Clean Water Technologies Inc. (CCWTI) is focused specifically on minimizing the cost, and simultaneously improving the performance, of water and wastewater management systems for its clients.

CCWTI, a privately owned Canadian company, is managed by some of the best professional engineers in Canada in the field of innovative water and wastewater management techniques and technologies. These professionals have a combined experience of over 150 years in the field of innovative techniques and technologies for the supply, conservation, treatment, reuse and overall management of water and wastewater.

Through the use of innovative techniques and technologies, CCWTI's professionals have been able to repeatedly demonstrate over the last several decades that its clients can save millions of dollars related to the cost of construction, renovation and operation of their water and wastewater systems.

David Amos & Associates

David Amos brings with him over 30 years of diverse experience in coordinating and delivering a vast array of community planning and regional works, land development initiatives, entrepreneurship and endeavor, strategic planning, tourism development, downtown core area revitalization, economic development, Municipal governance and grant procurement. In addition, Dave has assisted numerous clients in the site selection process. These clients have ranged from "Mom and Pop" businesses to major internationally recognized firms including; Adidas, Toyota Canada, Home Hardware, Dofasco, Maple Leaf Foods, Russel Metals and Gates Canada. Total fulfillment has been over three million square feet requiring over 1,000 acres.

A certified facilitator, Dave has achieved his success through careful facilitation of multiple stakeholders who need to find their way to their common aspirations. David has both a Master's degree and an Honors degree from the University of Waterloo specializing in land development and planning. He is proud to have been the only person to be President of both the Economic Developers Association of Canada and the Economic Development Council of Ontario.

He is a founding member of the Ontario Investment Centre and has been a team member of Invest Canada Trade missions. David has been an active participant on numerous economic development focused senior government task forces/committees including the Premier's Council on Economic Renewal and the national review committee for the program for Export Marketing Development.

Alvin Reinhard Fritz Architect Inc.

Alvin Reinhard Fritz Architect Inc. (ARFAI) was incorporated in 1989 and is registered in all of the Western provinces from British Columbia to Ontario and has engaged with multiple jurisdictions in each of these provinces providing a broad background of experience. In addition to being engaged for conventional architectural professional services ARFAI has also provided planning, land development and related services on a wide range of project types and developments. It is in this context that ARFAI provides consulting services in the context of the Integrated Development Study (IDS).

ARFAI also has a strong commitment to sustainability as the two architects in this firm, Alvin Fritz and Ian Moxon, are LEED accredited. Sustainability is a key focus of the IDS and has been upheld as a criterion of research and development of each respective discipline throughout the process of developing the Study.

Browning Horrocks Design Inc.

Browning Horrocks Design has been providing landscape architectural and land planning consulting services to the land development industry in Western Canada for over thirty years. As design professionals, their backgrounds are diverse covering landscape architecture, urban planning, environmental design and recreational &resort planning.

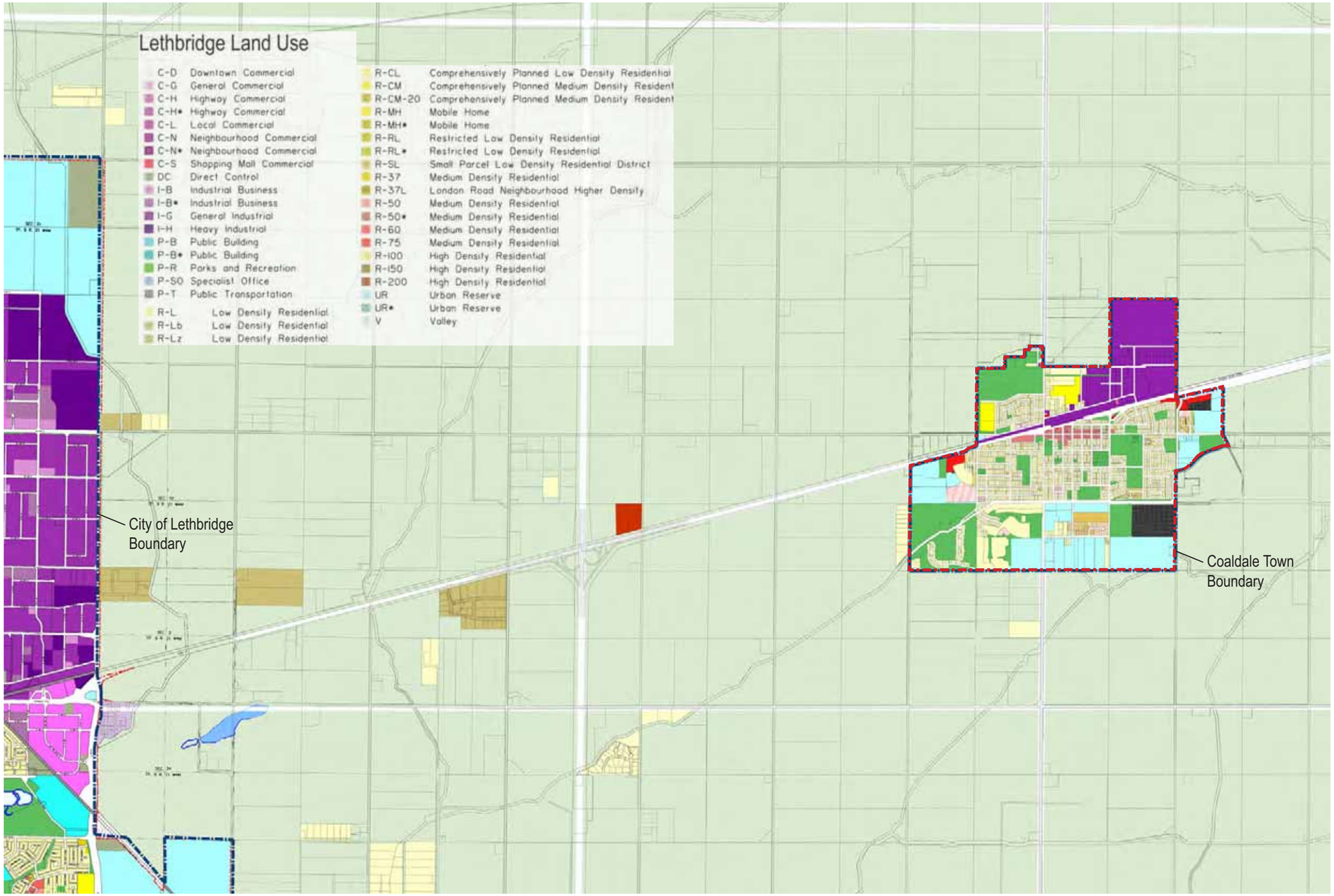
Browning Horrocks will be the participating landscape architects on the interdisciplinary study team established for "the municipalities" INTEGRATED DEVELOPMENT STRATEGY. Their role will centre on liaising with the consulting team to provide landscape architectural and land use planning expertise necessary in the completion of a 'forward-looking' master development plan for the Coaldale/Lethbridge Highway 3 corridor.

EBA Engineering Consultants Ltd.

EBA Engineering Consultants Ltd. (EBA) is a values-based consulting engineering and sciences company focusing on the transportation, mining, energy and development sectors. They are proud of their ability to create and deliver better solutions to their public and private sector clients. Over the last forty years, they have grown to provide a diverse range of consulting services in western and northern Canada. This company is founded on a strong belief in their core values, which drive them to be a world-class team in everything they do, and to support the development and careers of their employees while improving the communities in which they work.

EBA has offices located throughout Western Canada, with locations in Alberta situated in Edmonton, Calgary, and Lethbridge. With respect to the Integrated Development Strategy project, EBA would be responsible for providing geotechnical and environmental engineering services as required during the RCAP application, as well as during development of the Integrated Development Strategy. EBA has provided engineering services locally since the mid 1980s and their diverse engineering and science staff is well suited to meet the requirements of this project. Where specific expertise is required from one of EBA's other centres, those specialists would be bought in as required.

Appendix B - Land Use



Lethbridge County Land Use

- Rural Grouped Industrial
- Coaldale Lethbridge Corridor
- Grouped Country Residential
- Rural Agriculture
- Hamlet Direct Control

Coaldale Land Use

- Residential
- Residential Small Lot
- Residential Starter Lot
- Residential Multi-Family
- Mobile Home Park
- Country Residential 1
- Country Residential 1A
- Country Residential 2
- Commercial
- Highway Commercial
- Institutional / Recreation
- Industrial
- N/A Light Industrial
- Urban Reserve
- Utility

0m 1000m 2000m

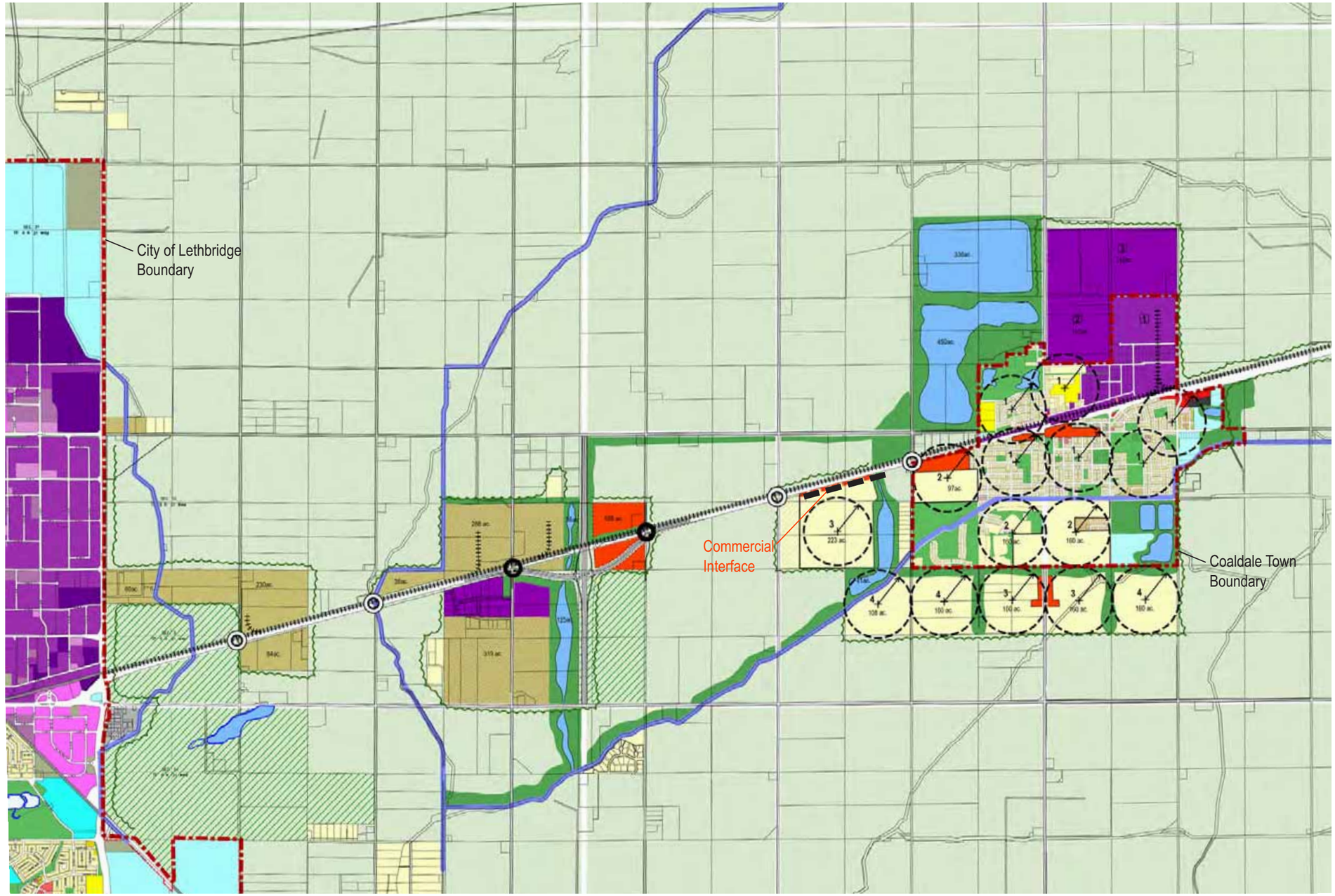
Scale 1:50,000

www.idsalberta.ca

Existing Land Use Plan

Figure 4.1

PLACEMAKERS CANADA INC.



Rural Industrial
Industrial
Rural Industrial or Grouped Industrial
Commercial
Rural Residential and Neighbourhoods
Agriculture - Urban Interface
Green Space
Crown Lands
Hamlet
Rural Boundary
Proposed Signalized Intersection
Possible Future Signalized Intersection
Neighborhood Unit
Possible Urban Interface

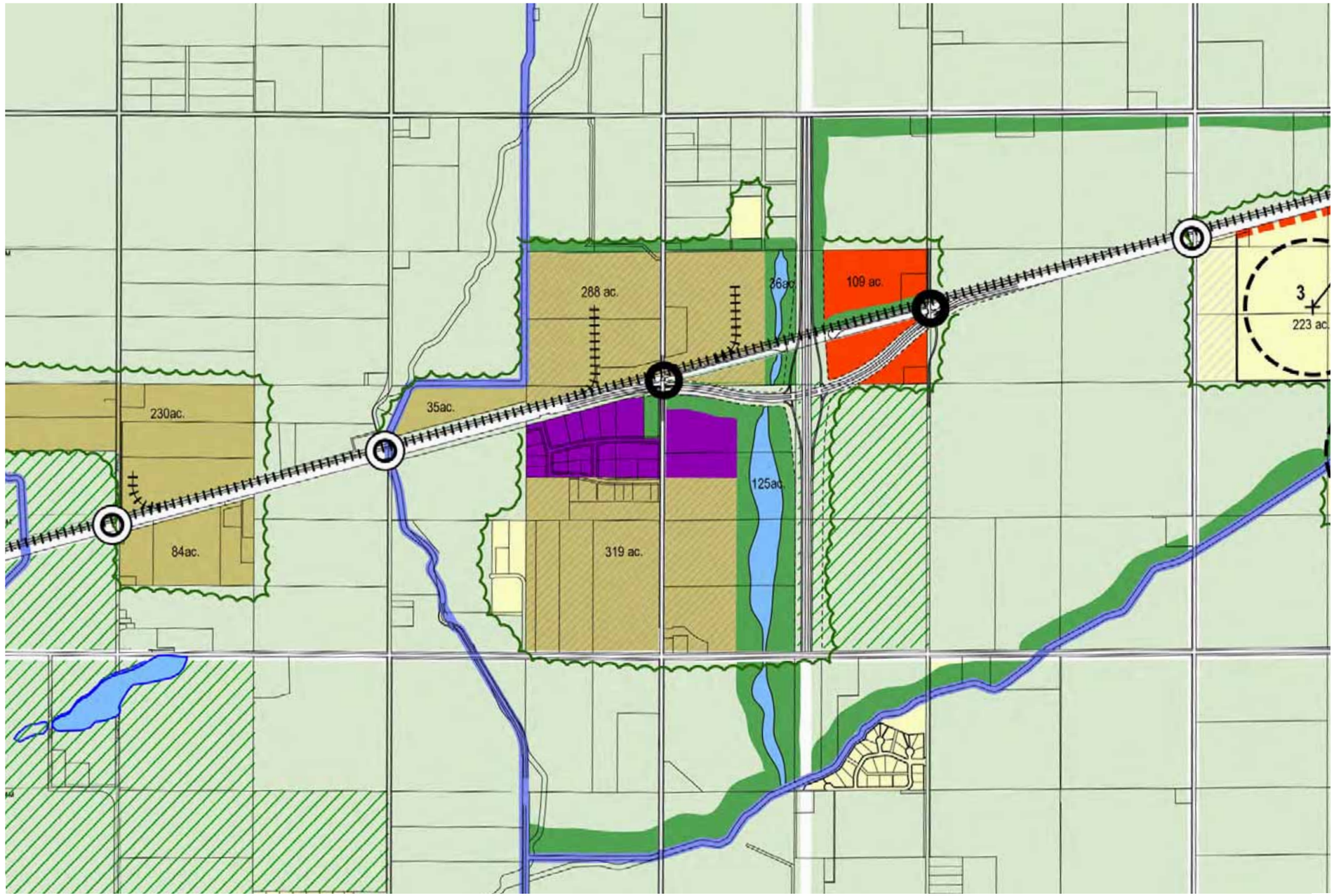
0m 1000m 2000m

Scale 1:50,000

www.idsalberta.ca

Conceptual Land Use Plan
Figure 4.2

PLACEMAKERS
CANADA INC.



Rural Industrial
Grouped Industrial Centre
Rural Industrial or Grouped Industrial
Highway Commercial
Rural Residential and Neighbourhoods
Agriculture - Urban Interface
Green Space
Crown Lands
Hamlet
Rural Boundary
Proposed Signalized Intersection
Possible Future Signalized Intersection
Neighborhood Unit
Possible Urban Interface

0m 500m 1000m

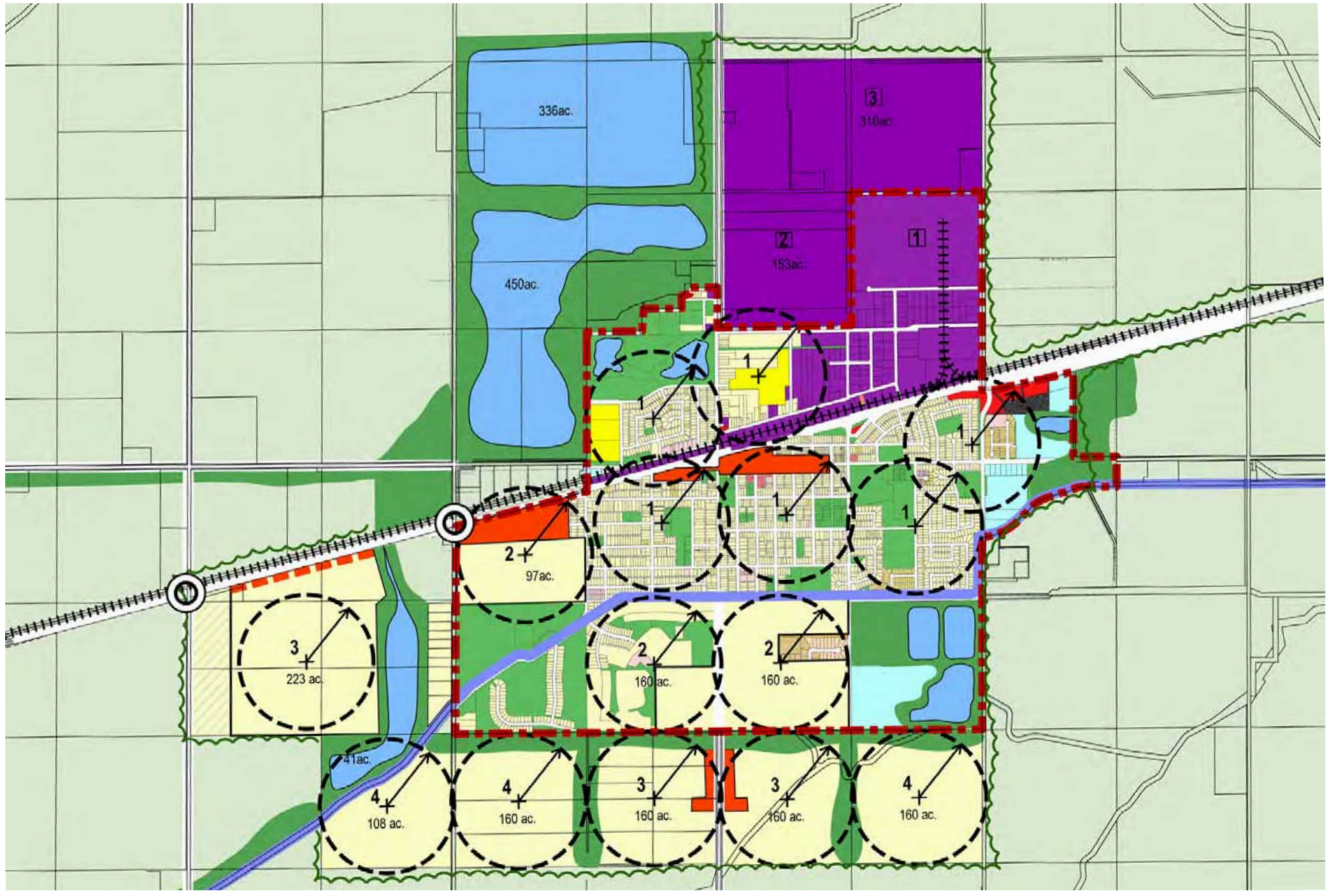
Scale 1:25,000

www.idsalberta.ca

Canamex & Highway 3 Interface

Figure 4.3

PLACEMAKERS CANADA INC.



Rural Industrial
Town Industrial
Commercial
Neighbourhood
Agriculture - Urban Interface
Green Space
Crown Lands
Hamlet
Rural Boundary
Proposed Signalized Intersection
Possible Future Signalized Intersection
Neighborhood Unit
Possible Urban Interface

0m 500m 1000m

Scale 1:25,000

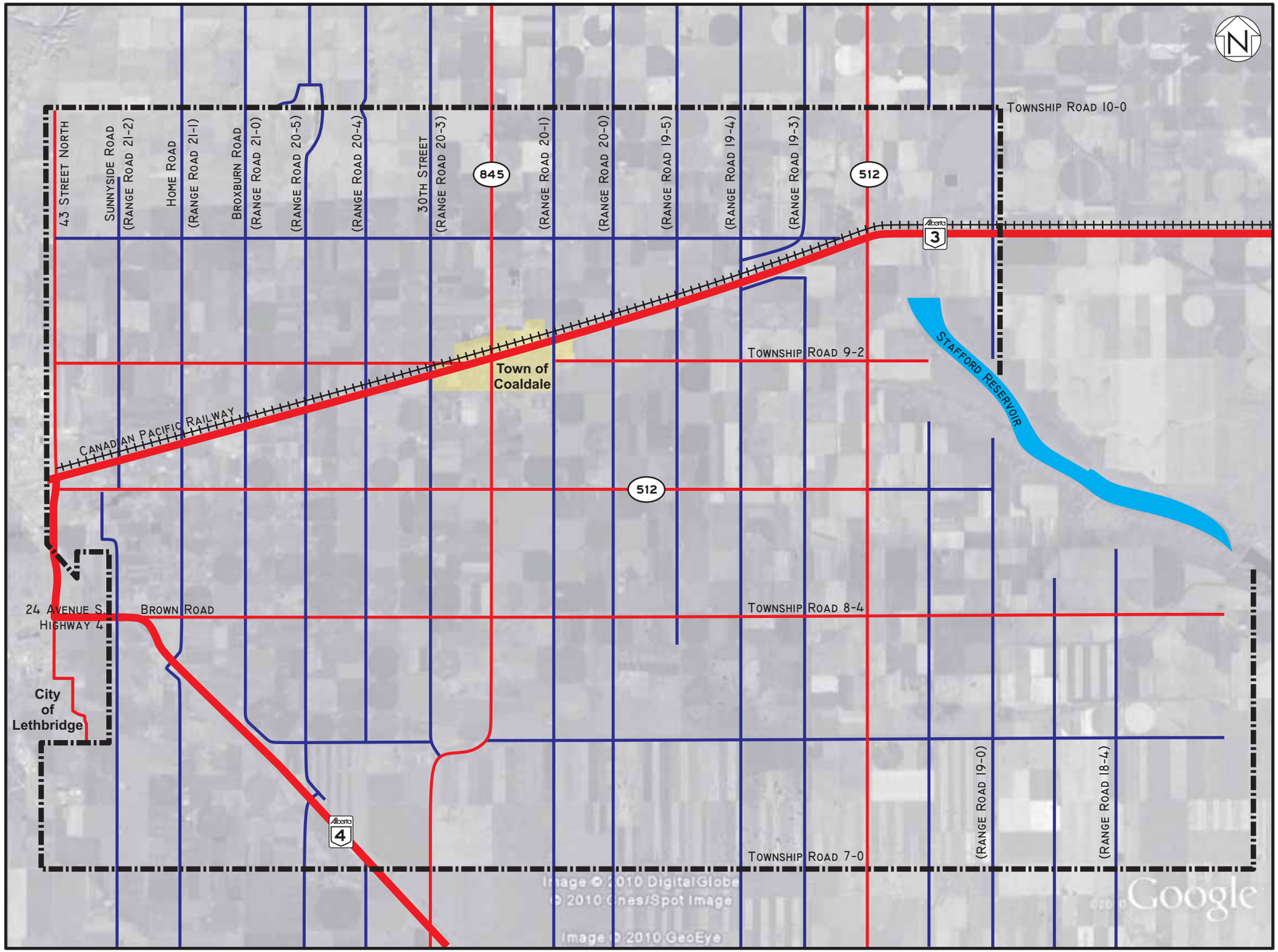
www.idsalberta.ca

Integrated Development Strategy

PLACEMAKERS CANADA INC.

Town of Coaldale
Figure 4.4

Appendix C - Transportation

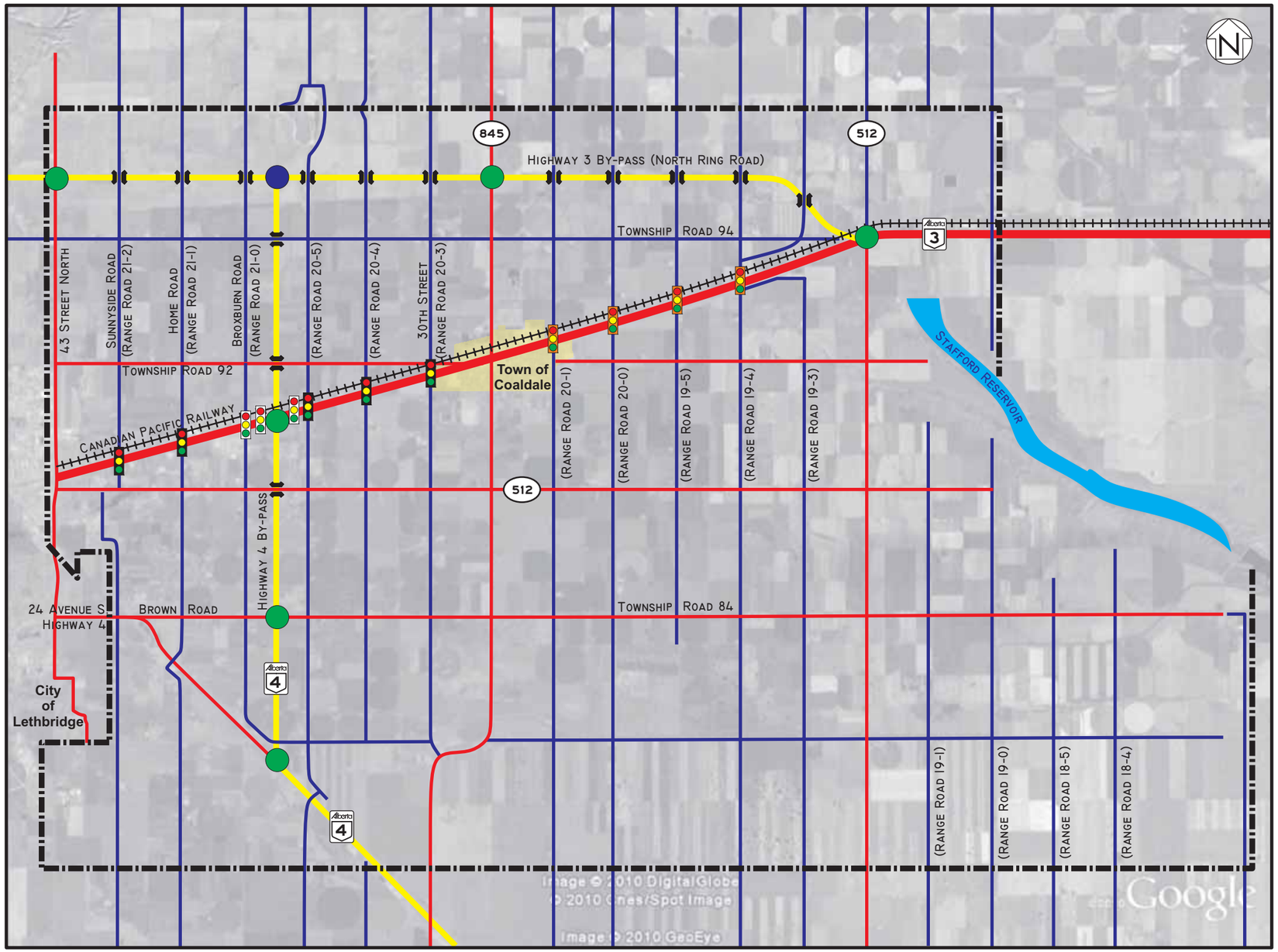


LEGEND

- Expressway
- Collector Road
- Local Road
- Study Boundary

Existing Transportation Network

Figure 5.1.1

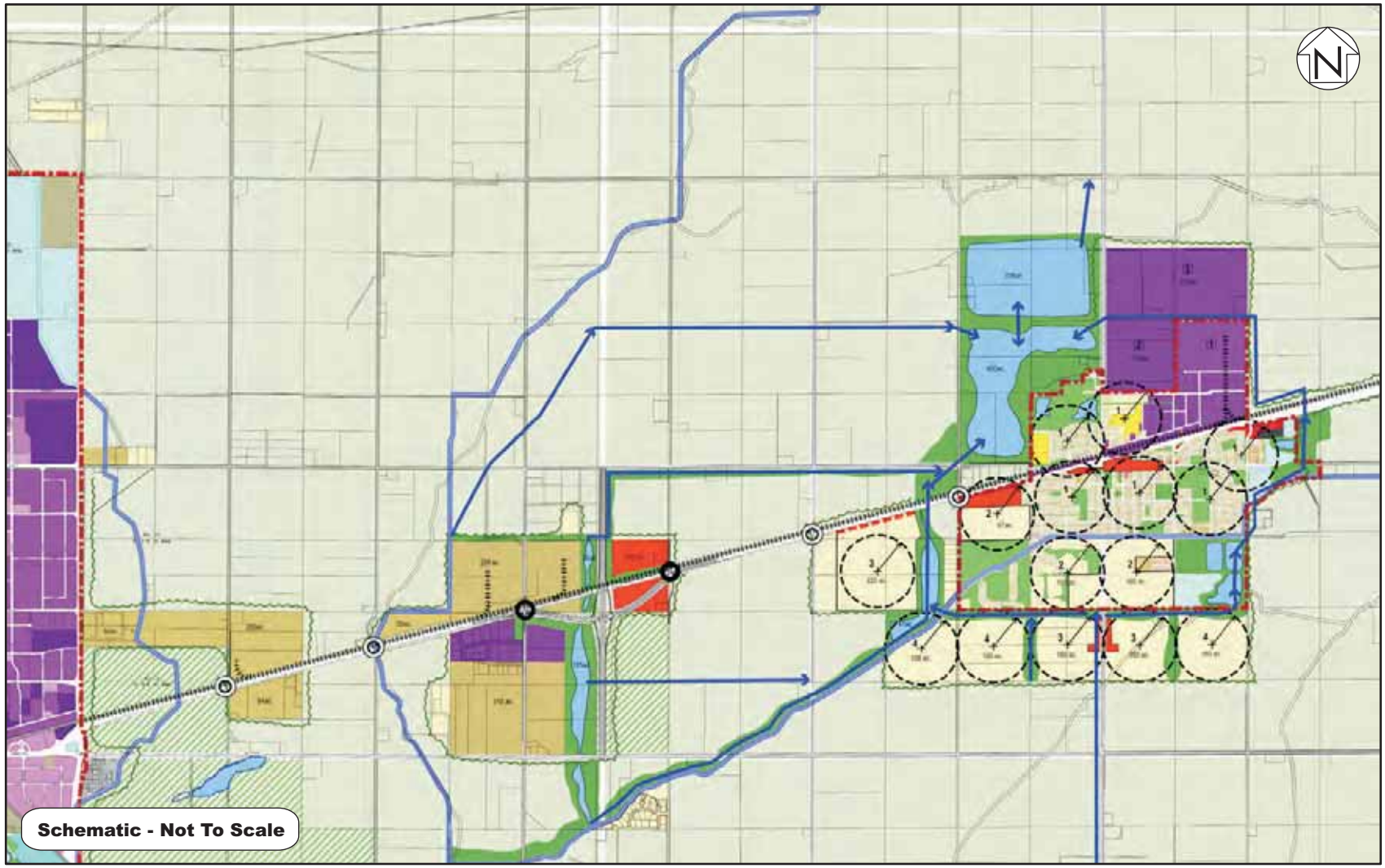


LEGEND

- Freeway
- Expressway
- Collector Road
- Local Road
- Study Boundary
- Potential Signals past 20-Year Horizon
- Potential Signals by 20-Year Horizon
- Ultimate Horizon
- Potential Interchange
- System Interchange
- Potential Flyover

Future Long Term Network

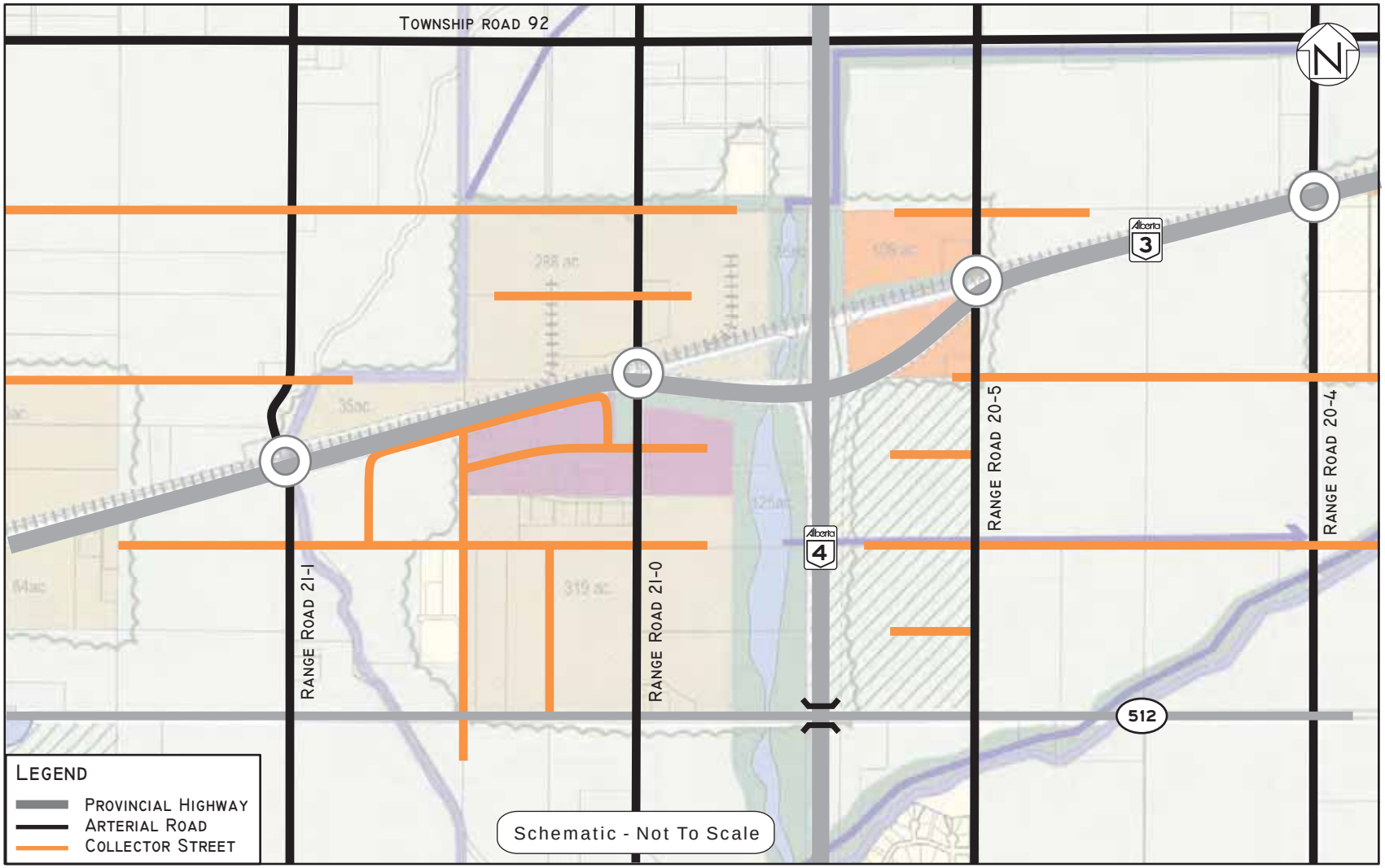
Figure 5.3.1



Proposed Development Concept

Figure 5.6.1

Integrated Development Strategy



Future Transportation Network

Figure 5.7.1

Appendix D - Stormwater Management

Appendix D - Stormwater Management Summary

INTRODUCTION

Initiated by the Town of Coaldale and the County of Lethbridge, the Integrated Development Strategy (IDS) will address a number of important concerns in the region, including storm water management and anticipated development adjacent to the proposed CANAMEX highway.

The IDS project encompasses the drainage area known as the Malloy Basin. This area is bounded to the north by Township Road 9-4, to the east by Stafford Reservoir at Range Road 182, to the south by the Saint Mary River Irrigation District (SMRID) main Canal at Township Road 82 and to the west by the City of Lethbridge city limits at approximately 43rd Street N (Highway 843).

Runoff from snowmelt and rainfall events drains primarily through a series of natural and constructed channels which form the backbone of the SMRID infrastructure in the region. Though portions of the system were designed to convey small storm events, the system as a whole has little capacity for the excess water generated by severe rainfall events, resulting in widespread flooding and damage to property and infrastructure. The most significant events in recent years have been the 2002, 2005, and 2010 floods, of which the 2010 flood alone has resulted in $38.47 million in payouts for damages from the Southern Alberta Disaster Recovery Program as of June 15, 2011.

The CANAMEX highway, directly linking Mexico to Alaska through the United States and Canada, will involve two bypasses in the region. Highway 4, through the City of Lethbridge, will be rerouted north between the City and the Town of Coaldale, where it will meet with Highway 3, which has been directed west to bypass north of Coaldale. It is anticipated that the construction of CANAMEX will lead to an increase in development in the lands adjacent to the highway. The County of Lethbridge and Town of Coaldale are ideally located to take advantage of this increased development.

With recent events and future development in mind, the need for an innovative and holistic approach to storm water management for the region exists. As a regional solution the Town of Coaldale and the County of Lethbridge, with support from their neighbours and area communities, have supported the creation of the Integrated Water Management Strategy (IWMS). The IWMS will approach water management from the view of storm water, water supply, and wastewater management, assisting the County and Town in their vision to become leaders in water management, a “best practice” for others to follow.

Objective

The objective of this report is to compile and review existing storm water studies, municipal reports, aerial photographs, and topographic information for the area. A base map has been developed (see Appendix A) which includes topographic information and the Malloy Drain layout for the study area. Following this report, further analysis will be performed based upon the existing topography of the area, existing and proposed infrastructure such as the CANAMAX highway development.

Data Collection

The following relevant reports have been reviewed:

- County of Lethbridge and the Town of Coaldale Intermunicipal Development Plan, Oldman River Regional Services Commission, Bylaw #1337 and Bylaw #631-P-02-10 accepted April 2010
- County of Lethbridge and the City of Lethbridge Intermunicipal Development Plan, Oldman River Regional Services Commission, Bylaw #1254 and Bylaw #5242 accepted August 2004
- Town of Coaldale Integrated Community Sustainability Plan, AECOM Canada Ltd., February 2009
- County of Lethbridge Integrated Community Sustainability Plan, Oldman River Regional Services Commission, 2009

- County of Lethbridge Municipal Development Plan, County of Lethbridge, Bylaw #1331 accepted January 2010
- Environmentally Significant Areas in the Oldman River Region, County of Lethbridge, Cottonwood Consultants Ltd., February 1987
- Malloy Drain Master Drainage Plan, MPE Engineering Ltd., March 18, 2010
- Highway 3 & 4 Lethbridge and Area NHS & NSTC (CANAMEX) Functional Planning Study, Stantec, May 2006 (Executive Summary Only)

In addition, a review of the current design standards for the region was performed. These include the City of Lethbridge Design Standards and the County of Lethbridge Engineering Guidelines and Minimum Servicing Standards.

Interviews were held with a number of stakeholders, including Firoz Kara and John Thomas of Alberta Transportation, Kathleen Murphy of Alberta Environment, Roy Ermter of the Town of Coaldale, and other personnel through the Charette process and at Steering Committee meetings.

Previous Reports

County of Lethbridge and the Town of Coaldale Intermunicipal Development Plan, Oldman River Regional Service Commission, Bylaw #1337 and Bylaw #631-P-02-10 accepted April 2010

- Growth within the County of Lethbridge and its largest town, Coaldale, led to the need for the Plan so as to "enable orderly development of the areas around Coaldale having regard for the needs of both municipalities by means of a mutually agreed upon process".
- Also, to act as a "referral mechanism to ensure dialogue and information is shared between the two municipalities regarding development in the fringe area".
- All future development, expansion or intensification must adhere to the Plan.
- Land in fringe area is mainly agricultural, with a number of confined feeding operations.
- Four areas of expansion for the town: Harrison, Evergreen Estates, Spruce Woods Country Estates and east of town between 20th Ave and the SMRID irrigation canal. Of these, only Evergreen Estates has an Area Structure Plan (ASP). Both the Town and the County have expressed that ASPs must be in place prior to any expansion in any of the other subdivisions.
- 2006 Statistics Canada population for Coaldale was 6,177 and the County was 10,302. In 2009, the Town of Coaldale conducted their own municipal census, and the population was 6,943.
- Commercial development is occurring primarily along Highway 3, with additional future development to occur adjacent to the CANAMEX Highway once it is constructed.
- Relevant issues identified in the Plan include: land use and development standards (especially storm water management), and areas of special concern, including the Malloy Drain, CANAMEX corridor, Birds of Prey centre and highway entrances.
- 4.3.4: "Eligible fragmented parcels of 20 acres or less . . . may be considered for further subdivision but only in accordance with an approved conceptual design scheme or ASP . . . including an engineered storm water management plan . . . ".
- All development in the County must meet their Engineering Guidelines and Minimum Servicing Standards manual.
- 4.8.2 and 4.8.3: "Any development proposal within the Town of Coaldale / County of Lethbridge Intermunicipal Development Plan (IMDP) boundary must address storm water drainage and include considerations for how it may impact the Malloy Drain and the County of Lethbridge / Town of Coaldale".
- 4.8.4: "Both municipalities support commitment to a Malloy Drain basin storm water management plan, and may enter into separate discussions or agreements regarding any aspects resulting from the final drainage study."
- 4.8.5: "Both municipalities recognize the regional importance of the Birds of Prey centre and agree to take into consideration the Birds of Prey existing operations and expansion plans (which may depend on outcomes of Malloy basin drainage study) when making long-term land use decisions in proximity to the Birds of Prey cen-

tre."

- Developers in the Plan area must submit their stormwater management plans to both the County and the Town for review a minimum of 21 days prior to submission to Alberta Environment.

County of Lethbridge and the City of Lethbridge Intermunicipal Development Plan, Oldman River Regional Service Commission, Bylaw #1254 and Bylaw #5242 accepted August 2004

- The Plan is the "next step in a continuing process of cooperative land use planning between the City and the County of Lethbridge.
- Little mention of stormwater management, with the exception of section 5.2.5: "Storm water control may require joint cooperation in certain areas of the Intermunicipal development plan area . . . specific agreements should be considered when the areas are identified".

Town of Coaldale Integrated Community Sustainability Plan, AECOM Canada Ltd., February 2009

- A way to "proactively address challenges and move towards a sustainable future".
- Vision statement is "Coaldale: A preferred community to live, work and play".
- The Plan is "an opportunity for communities to look long-term at the community they want and take the pro-active steps to move there".
- Plan identifies stormwater as a potential resource, and also the decommissioned water reservoir as a prospect-ive development.
- The Plan also notes that it should continue efforts to encourage collaboration between Coaldale and regional actors regarding the release of stormwater.
- Results from Open House and Focus Group include:
    - the recommendation to ensure that the "storm water challenges are turned into an opportunity to expand community amenity features";
    - "expand the world famous and award winning Birds of Prey Nature Centre"; and
    - "ensure the community becomes walk-able with appropriate connections through parks and centres and across existing canals and roadways".
- Included among the projects to result from this Plan is an Infrastructure Master Plan.

County of Lethbridge Integrated Community Sustainability Plan, Oldman River Regional Services Commission, 2009

- "Visioning document intended to provide a blueprint for sustainability for the County and its residents".
- It is noted in the plan that "a significant proportion of wetlands in the County of Lethbridge have been con-verted or removed from their natural state for other land uses".
- Steps to conservation include: considering the conservation of wetlands and the return of wetlands to their natural state through the creation of policies in official plans; work with intermunicipal neighbours to address storm water issues, such as the Malloy Drain; and encourage natural wetland design in new subdivisions.
- Need for new sources of clean water for residents – challenges include higher intensity land use and surface and ground water contamination.
- Future reports to be completed for the County include an Infrastructure Master Plan, Transportation Manage-ment Plan, and the Engineering Guidelines and Minimum Servicing Standards document. Of these, the latter was published in May 2009.

County of Lethbridge Municipal Development Plan, County of Lethbridge, Bylaw #1331 accepted January 2010

- Purpose is to "provide (the County) with a framework that will guide development oriented decision-making processes in order to achieve the County's vision".
- Long term planning of 20 year horizon, with contents revisited every 5 years.
- Winters are generally mild, with occasional Chinooks.
- County population in 2006 was 10,302 persons, with 2031 projections of 12,000 to 14,000 persons.

- Country residential accounts for over half of all subdivision activity in the County.
- One of the goals of the Plan is to "protect the future CANAMEX trade corridor from over development prior to its construction".
- Policy 6.1.3 (a): The County shall restrict development within 30 m of the boundary of an irrigation canal.
- Policy 6.1.3 (d): land in the Coaldale Lethbridge Corridor will "be reserved for commercial and industrial use" unless they are currently zoned otherwise.
- For future ASPs, developer must provide contour and surface drainage control "to protect water bodies and adjacent parcels" (no mention of release rate, quantity or quality).
- All new residential developments must meet the Engineering Guidelines and Minimum Servicing Standards.
- Commercial developments must provide "suitable storm drainage and, if required, a possible storm management plan which meets Alberta Environment requirements and the County Municipal Engineering Standards".
- CANAMEX trade corridor is to be protected from development until ASPs meet Alberta Transportation's approval.
- Plan states that "County Council may require, as a condition of subdivision, a professionally prepared storm water management plan that demonstrates the best possible storm water management practices that will mitigate post-development runoff rates to the standards set forth in the County's Municipal Engineering Guidelines and Minimum Servicing Standards.

Environmentally Significant Areas (ESAs) in the Oldman River Region, County of Lethbridge, Cottonwood Consultants Ltd., February 1987.

- Within the vicinity of the IDS study area, and potential areas of use, there are a number of ESAs, including:
    - Eight Mile Lake, north west of Coaldale, is a regionally significant site with a permanent marsh. Habitat for "puddle" ducks and marsh birds;
    - Coaldale Reservoir, north east of Coaldale, is a regionally significant site with permanent wetlands, which support "diving" ducks (rare in this area). Deep marsh developing along the shore, encouraged by the relatively stable water levels;
    - The Oldman River and valley slopes is a provincially significant site with extensive nesting areas for birds of prey, Great Blue Herons, Pelicans and others, a number of which are very sensitive to the presence of human activity. A number of prehistoric sites and paleontological sensitivity zones are also located along the Oldman River north of Coaldale;
    - Chin Coulee, south east of Coaldale and surrounding Chin Reservoir, is a regionally significant site with permanent wetlands. It is a key Mule Deer habitat and waterfowl staging area; and
    - South of Coaldale, where Highway 845 jogs to the east is an area with Aeolian sands.

Malloy Drain Master Drainage Plan, MPE Engineering Ltd., March 18, 2010

- Plan initiated by the Town of Coaldale, County of Lethbridge and the SMRID.
- Malloy drainage basin is centred on the Town of Coaldale, covering approximately 21,662 ha (217 km2). The system consists of natural and constructed canals connected to an underground network of supply pipelines. The system discharges to Stafford Reservoir, whose levels are controlled by flows into and out of Chin Reservoir, south of Stafford Reservoir.
- The Town is required to detain all stormwater during a storm event for later release as per their conveyance agreement with the SMRID.
- SMRID does not want to handle stormwater flow due to nutrient loading and the canals were not designed with stormwater management in mind. However, if it must then it would prefer the water be held and released post-peak event.
- Conversations with landowners confirm that the area is receiving more precipitation in the last decade than it has historically. The 2002 storm (143mm) was greater than the calculated 1:100 year event for the area of 109.9mm.

- Capacity of the Malloy Drain is limited to 15 m3/s at some sections, while modeling shows the 1:100 year storm could generate peak flows of 50 m3/s.
- In general, channels are sized to accommodate the 1:20 to 1:50 year storm events, though some of the Lower Malloy channel has only a 1:5 year storm event capacity.
- The levels in Stafford Lake are held constant by controlling the flow into and out of Chin Reservoir to the south and the Main Canal to the north.
- The Town owns 12 storm ponds and has three privately owned ponds for developments within the town for a total storage of approximately 544,500 m3 with future expansion estimated at approximately 105,310 m3.
- The County of Lethbridge has identified 25,637 m3 in constructed storage and 2,821,564 m3 of storage in naturally and flood areas (estimated from contour map, for modeling purposes only).
- Major system bottlenecks identified as:
    - Lower Malloy Drain (especially upstream of HWY 512)
    - Culverts along Lower Malloy Drain and South Coaldale Drain
    - Coaldale Lateral especially west of and in the Town of Coaldale
- If areas listed as “to be developed” are fully constructed, there will be a shortage of 2.6 million m3 of storage.
- Possible future “pond” areas identified include the abandoned raw water reservoir or the sewage lagoons, if they are to be replaced in the future by a Waste Water Treatment Plant.
- Need identified for a pond in Cottonwood development south west of Town.
- For future development, recommended release rate of 0.4 L/s only after storm events (no release during events). If the system is upgraded, once complete, release rates of 2 L/s would be permitted.
- A number of alternatives were developed and explored in detail:

Alternative	Description	Approximate Cost
1	Status Quo	flood damages and intangibles
2	Buy out frequently affected lands	$7,208,000
2A	Obtain flood easements on frequently affected lands	$1,450,000
3	Combination of storm detention ponds and enlargement of existing drainage works	$27,250,000
3A	Purchasing land for natural ponding sites to replace a portion of the constructed storage works identified in Alternative 3	$20,700,000
3B	Acquiring flood easements for natural ponding sites to replace a portion of the constructed storage works identified in Alternative 3	$15,200,000
4	Fully expand the Malloy Drain	$30,500,000

Highway 3 & 4 Lethbridge and Area NHS & NSTC (CANAMEX) Functional Planning Study, Stantec, May 2006 (Executive Summary Only)

- The study provides planning-level information for the future location and requirements of the CANAMEX highway corridor.
- Potential environmental conflicts include rattlesnake hibernacula.
- The proposed route will cross several historically significant sites.
- No mention of storm water impacts or mitigation measures.

Design Guidelines

Currently, it is understood that the Town of Coaldale is using the City of Lethbridge Design Standards. To summar-

ize, these guidelines recommend:

- Minor system Level of Service: 1 in 5 year event.
- Major System Level of Service: 1 in 100 year event.
- Trap lows to a maximum depth of 300 mm.
- Peak post development flow rates shall not exceed pre-development flows resulting from a 1 in 5 year event.
- New developments to treat stormwater quality to 85% removal of sediments of particles 75 microns or greater as per Alberta Environment guidelines.
- Lethbridge erosion control measures in place include “a street cleaning program, placing limitations on pesticide use, instituting a doggie bag program and requiring catch basin sumps”.
- Concentrated flows over river banks or down unprotected slopes are not allowed. Sheet flow allowed if erosion control measures have been implemented.
- Best Management Practices encouraged.
- All foundation drains (weeping tile) are to drain to stormwater lines (never to sanitary).
- Sump pump outlets and roof leaders to discharge flows no closer than 1 m from the property line.
- Non-residential or multi-family residential must retain all stormwater over the 1 in 5 year and up to the 1 in 100 year event.
- Design storms to be used include:
    - One in 5 year 4 hour duration Chicago storm modified for Lethbridge;
    - One in 100 year 4 hour duration Chicago storm modified for Lethbridge; and
    - One in 100 year 24 hour duration Chicago storm modified for Lethbridge.
- Historical modeling also suggested, though not mandatory.
- Table 3.3.1.3 Percent Impervious Area (recommended values).
- Rational method can be used for initial sizing of pipe systems.
- Also applicable are the Alberta Environment guidelines with respect to:
    - Flow velocities and minimum slope; sewer hydraulics; size, material, and cover; maintenance;
    - BMPs, including source control, lot level, conveyance system and end-of-pipe BMPs; and
    - Quality control.

The County of Lethbridge has recently finalized its own set of guidelines, the County of Lethbridge Engineering Guidelines & Minimum Servicing Standards. These can be summarized as follows:

- These standards are to act as an appendix to the County of Lethbridge Development Agreement.
- “For both rural and urban development, the storm water system will either be designed based upon a “net-zero” impact (runoff rates for a 24 hour duration, 1:100 year post development design storm will not exceed rates for the same design storm under pre-development conditions) or on the available capacity of the receiving stream and appropriate area contributions”.
- Minor system designed for the 1-in-5 year event, the major system a 1-in-100 year event.
- Rational method may be used for minor system design.
- “The ratio of land area for open space use around the (storm water) pond will be twice the area of the water surface for the 1-in-100 year runoff event, unless approved otherwise”.
- Design standards for wastewater and water distribution are as per City of Lethbridge and Alberta Environment design guidelines.

Discussion with Roy Ermter, Town of Coaldale Director of Operations, December 9, 2010

- All buildings constructed in the Town prior to the year 2000 have their weeping tile connected to the sanitary system, however since twinning the sanitary lines along 13th Street in 2009, the number of sewer backups have become almost non-existent, even during the 2010 flooding. It was noted that prior to the lines being twinned, the backups were mostly clean water, likely from the perimeter drains not having capacity to deal with the storm water.
- There is an existing 300 mm force main for the sanitary system which takes waste from the lagoons to the Oldman River. No excess capacity exists for stormwater flows.
- Included in Appendix B are the Town of Coaldale Storm System Map, Storm Pond Map and table with Storm Drainage System data.
- Stormwater from the Town is held until the peak of the storm is over and capacity is available in the SMRID drains. It is then released into the SMRID canals by pumping from the East Pond into the ditch along HWY 3, by pumping from 11th Street Pump Station into South Coaldale Drain, and by releasing from the Cheese Factory Drain into the Malloy Drain.. This water flows east into the Malloy Drain, and then to Stafford Reservoir.
- During the 2010 storm, Stafford Reservoir came close to overflowing.
- Currently, the ponds in the Land O' Lakes Golf Course are connected to the SMRID canal; as the water level rises in the canal, so does the water level in the ponds. The SMRID is requesting that the ponds be disconnected from the canals.
- Further industrial development in the northeast (in the area of 13th Street and 14th Avenue) is planned, with a storm pond being constructed as developers require fill for their sites.
- It was observed that most major storms in the region occur in June, and though the official climate records are taken in Lethbridge, the Town has observed higher amount and intensity rainfall than the City.
- On the south edge of Town, the Coaldale Lateral irrigation canal is elevated above both the adjacent residential area to the north and the South Coaldale Drain to the south.

Site Visit Observations

On June 21, 2010 several members of the consultant team had the opportunity to observe the IDS project site via a helicopter tour during severe flooding conditions. Observations supported the areas identified in the Malloy Drain Master Drainage Plan as areas of recurrent flooding.

Charette Process

During the week of February 7th, 2011, representatives from the IDS consulting team organized a public Charette to gain feedback from local stakeholders. Participants included representatives from the Town of Coaldale, the County of Lethbridge, the City of Lethbridge, SMRID, Oldman River Regional Services Commission (ORRSC), local landowners, business owners and residents.

The Placemakers team guided the discussion on future land uses and development direction given the local constraints and opportunities. By the end of the Charette, in cooperation with all stakeholders, a draft Land Use Plan was developed for the region, a copy of which can be seen in Figure 2 on the subsequent page. As the plan was developed, the Westhoff team had the opportunity to integrate stormwater management planning into the study, such that the regional solution, when put into place, will be able to provide stormwater management for new development as well as solving the current issues. The stormwater storage facilities shown in Figure 2 are for location purposes only; sizes are approximate and subject to change.

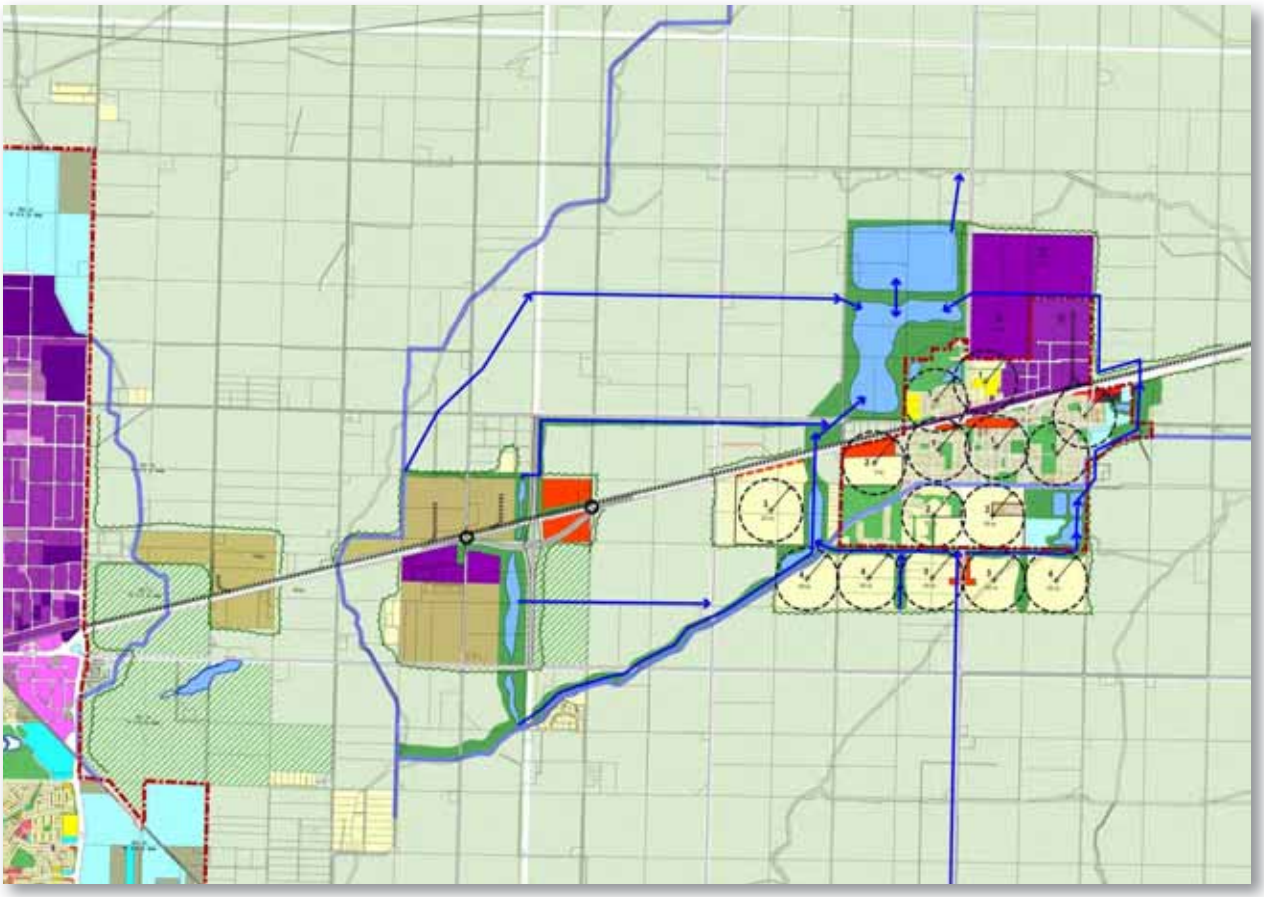


Figure 1 Draft Land Use Plan Presented February 11, 2011

Environment Canada Historical Precipitation Data

Climate data is currently collected by Environment Canada in two locations in the vicinity of the Project Site, the Lethbridge County Airport and the Lethbridge Research Station, referred to by Environment Canada as “CDA”.

The Lethbridge County Airport is located south east of the City of Lethbridge and approximately 16 km southwest of the Town of Coaldale. Historical data exists for this station between the dates January 1, 1938 and July 31, 2008 with data gaps between.

CDA has data from February 1, 1908 through to the present date.

Currently, Environment Canada has only processed portions of each of the data set through its quality control program, which checks for erroneous values. Data was extracted with the preference for: Airport processed data, CDA processed data, Airport unprocessed data, and finally CDA unprocessed data.

From	To	Source
2/1/1908	12/31/1937	CDA Unprocessed
1/1/1938	11/30/1992	Airport Unprocessed
12/1/1992	3/31/1994	Airport Processed
4/1/1994	12/31/1994	Airport Unprocessed
1/1/1995	1/31/1995	CDA Processed
2/1/1995	4/30/1995	Airport Processed
5/1/1995	8/31/1995	CDA Processed
9/1/1995	3/31/2006	Airport Processed
4/1/2006	6/30/2008	CDA Processed
7/1/2008	7/31/2008	Airport Processed
8/1/2008	Current	CDA Processed

Occasionally, the station missed one or two days of data; these were replaced with zero for precipitation values and the monthly climate normal for temperature, as listed below.

	Unit	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Daily Average Temp.	ºC	-7.8	-4.6	-0.2	6.0	11.3	15.5	18.0	17.7	12.6	7.0	-1.5	-6.1
Rainfall	mm	0.1	0.4	1.4	16.1	49.4	63.0	47.5	45.1	37.6	8.8	1.2	0.5
Total Precipitation	mm	17.6	11.6	24.0	31.1	53.5	63.0	47.5	45.8	39.6	18.9	16.9	16.7

Digital Data Collection

Digital data for the production of mapping and figures was provided by the following agencies:

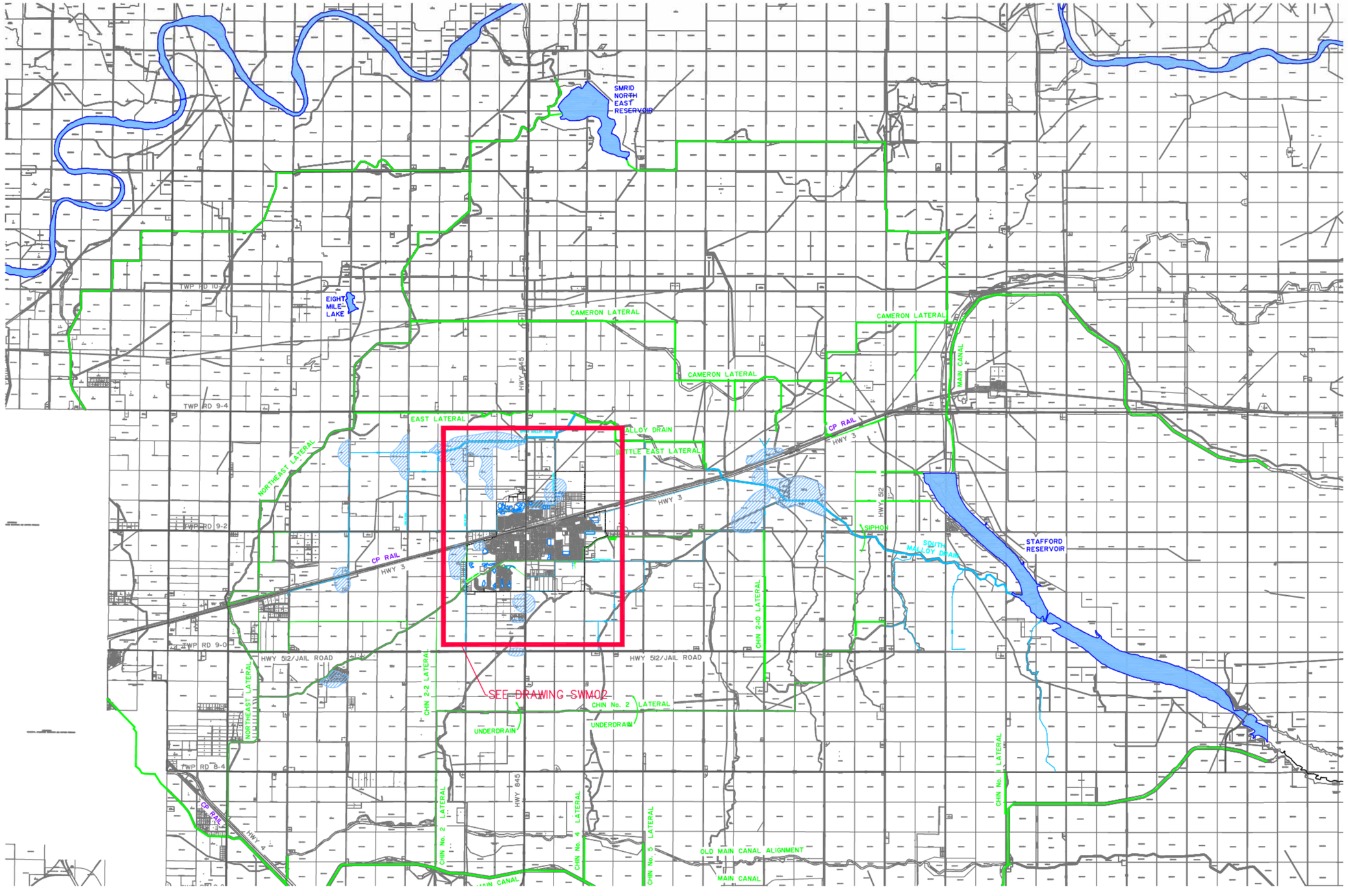
Source	Data Type
AltaLIS	County Legal Base
County Topography	
County of Lethbridge GIS Department	Utility Locations
SMRID Lateral and Drain Network	
2009 County Air Photo	
Town of Coaldale Operations Staff	Coaldale Storm Pipe Network
Coaldale Storm Ponds	
Coaldale Sanitary Lagoons and Forcemain	
Coaldale Sanitary Pipe Network	
Coaldale Water Supply Network	
Coaldale Legal	
St. Mary's River Irrigation District (SMRID)	Lateral and Drain Network Details and Sections
Alberta Transportation	Highway 845 Plan and Profile Drawings

Currently, the topographic information provided by AltaLIS is based upon points taken at 100 m intervals. Additional data will be required in order to perform detailed analysis on the catchments in further studies for individual components of the Regional Stormwater Concept. LiDAR ('Light Detection and Ranging' or 'Laser Imaging Detection and Ranging) is an effective method of obtaining detailed topographic information on a region. Currently, the most recent publicly available LiDAR acquisition for the region was obtained in 2007 and is available from an online provider by the name of Valtus Imagery Services. Valtus is a division of North West Geomatics Ltd and, in partnership with a number of local and international partners provides access to multiple resolution imagery layers for

large area analysis. Their costs are as follows:

Total Order Size (sq km)	Price (sq km)	Price (Tile – 4 sq km)
4-100	$440	$1,760
104-260	$340	$1,360
264-500	$280	$1,120
504-1,000	$225	$900
1,004-2,500	$200	$800
2,504-5,000	$170	$680
5,004-10,000	$130	$520
10,004-25,000	$90	$360
20,004 +	$60	$240
Reproduced courtesy of Valtus Imagery Services, www.valtus.com, April 2011		

Alternatively, LiDAR data could be collected specifically for this project by flying the project area. A number of local providers in the area are available for these services.



LEGEND

- SMRID CANAL
- SMRID DRAIN
- ROAD
- FREQUENTLY FLOODED AREAS
- EXISTING STORMWATER POND

www.ldsalberta.ca

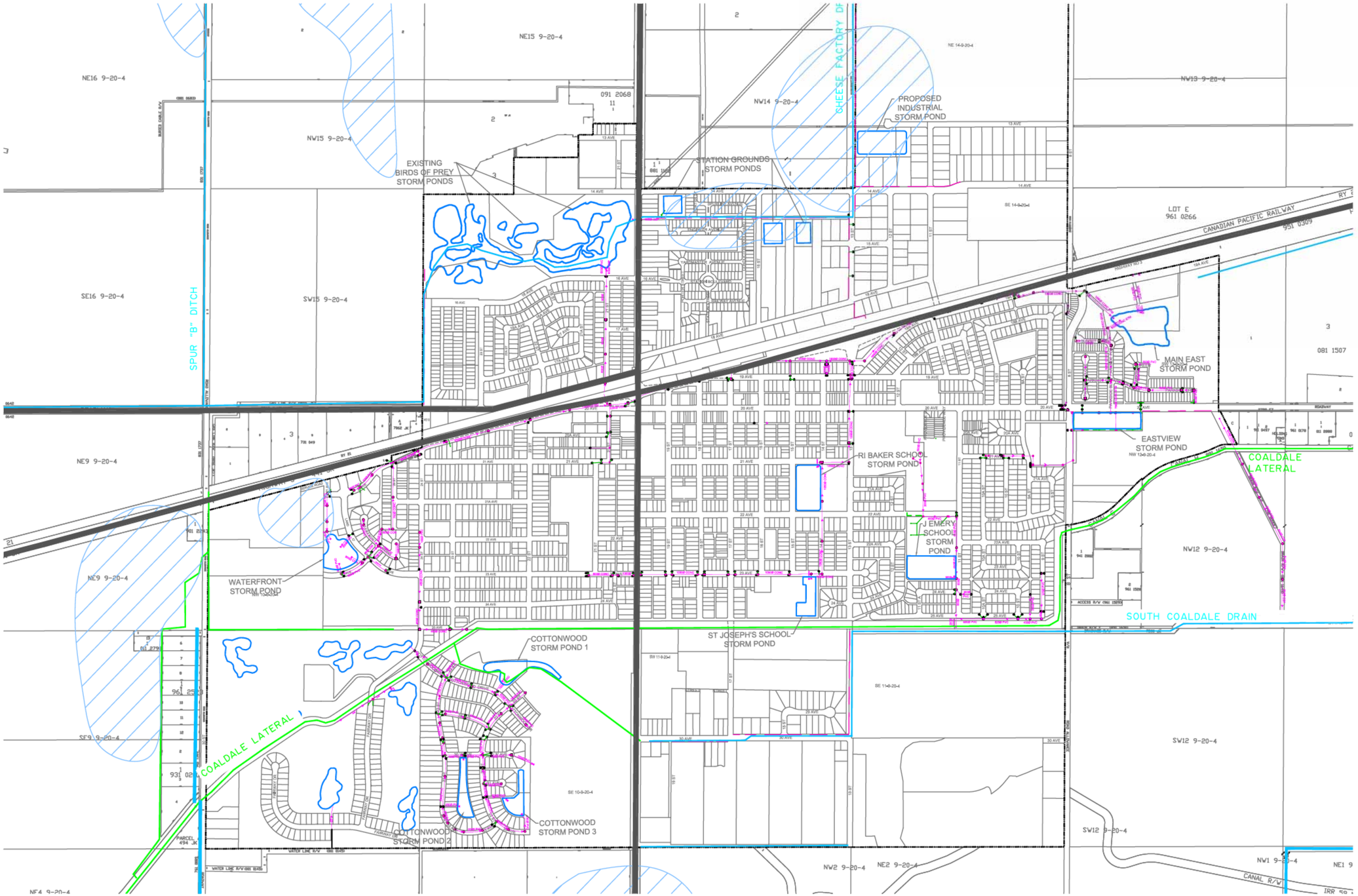
Integrated Development Strategy

ALVIN REINHARD FRITZ ARCHITECT INC. · Browning Horrocks design · Canadian Clean Water Technologies Inc. · David Amos & Associates · D.A. Watt Consulting · eba A TETRA TECH COMPANY · PLACEMAKERS CANADA INC. · Westhoff Engineering Resources, Inc. Land & Water Resources Management Consultants

Westhoff Engineering Resources, Inc.
Land & Water Resources Management Consultants

Drawing SWM01 Regional Base Map

DRAWN BY : K. Sullivan
CHECKED BY : D. Westhoff
DATE : September 2011



LEGEND

- SMRID CANAL
- SMRID DRAIN
- ROAD
- FREQUENTLY FLOODED AREAS
- EXISTING STORMWATER POND
- STORM PIPE
- MANHOLE
- OUTLET STRUCTURE

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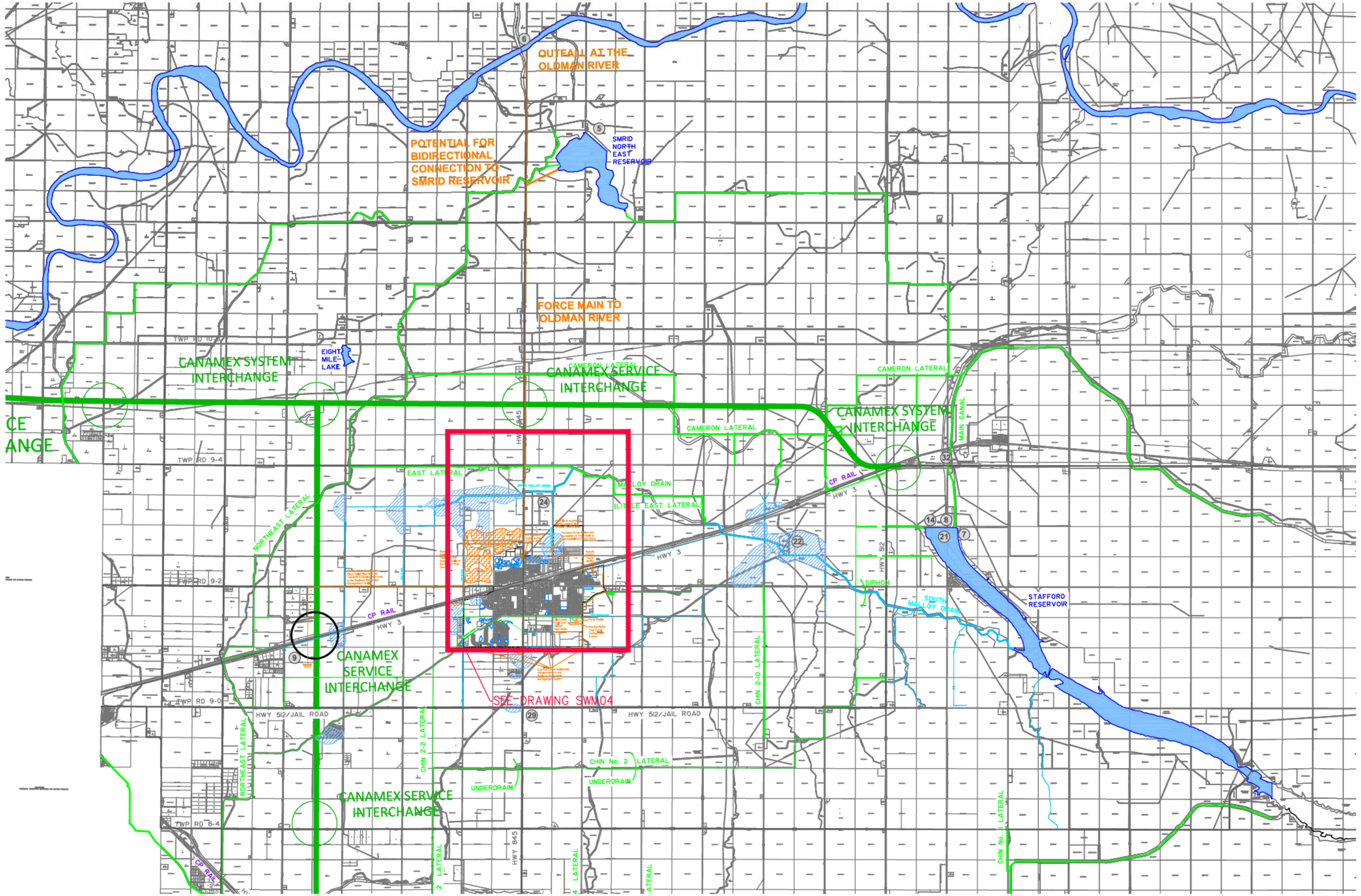
Westhoff Engineering Resources, Inc.
Land & Water Resources Management Consultants

Drawing SWM01 Town of Coaldale Base Map

DRAWN BY : K. Sullivan
CHECKED BY : D. Westhoff
DATE : September 2011

Integrated Development Strategy

ALVIN REINHARD FRITZ ARCHITECT INC. · Browning Horrocks design · Canadian Clean Water Technologies Inc. · David Amos & Associates · D.A. Watt Consulting · eba A TETRA TECH COMPANY · PLACEMAKERS CANADA INC. · Westhoff Engineering Resources, Inc. *Land & Water Resources Management Consultants*



LEGEND

- SMRID CANAL
- SMRID DRAIN
- ROAD
- FREQUENTLY FLOODED AREAS
- EXISTING STORMWATER POND
- STORM PIPE
- MANHOLE
- OUTLET STRUCTURE
- PROPOSED STORMWATER STORAGE FACILITY
- PROPOSED PUMP STATION
- PROPOSED WETLAND TREATMENT SYSTEM
- PROPOSED STORM PIPE
- PHOTO LOCATION
- PROPOSED CANAMEX HIGHWAY

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Drawing SWM03 Regional Drainage Concepts

DRAWN BY : K. Sullivan
CHECKED BY : D. Westhoff
DATE : September 2011

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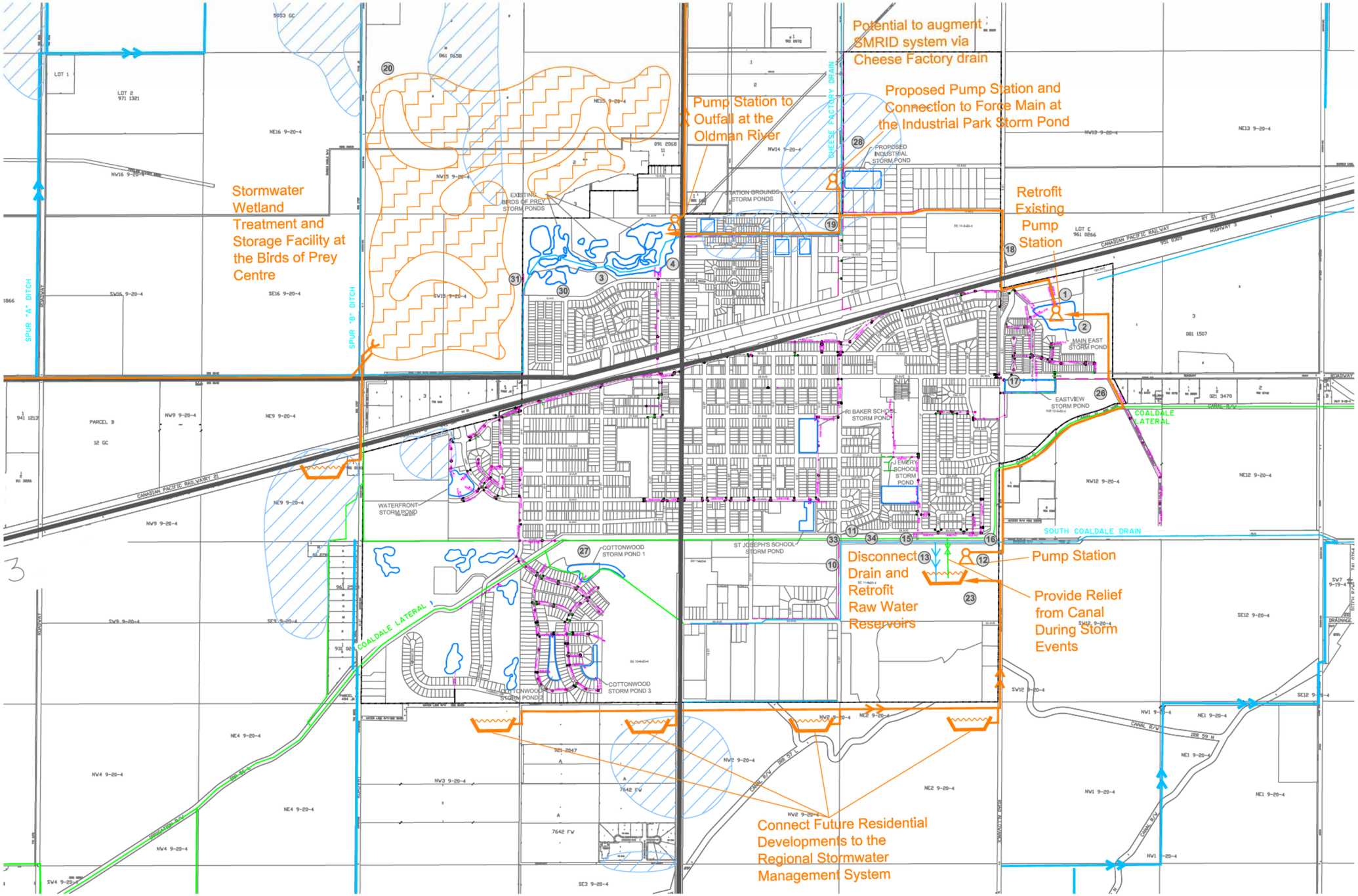

LEGEND

- SMRID CANAL
- SMRID DRAIN
- ROAD
- FREQUENTLY FLOODED AREAS
- EXISTING STORMWATER POND
- STORM PIPE
- MANHOLE
- OUTLET STRUCTURE
- PROPOSED STORMWATER STORAGE FACILITY
- PROPOSED PUMP STATION
- PROPOSED WETLAND TREATMENT SYSTEM
- PROPOSED STORM PIPE
- 28 PHOTO LOCATION

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Drawing SWM04
Town of Coaldale
Drainage Concepts

DRAWN BY : K. Sullivan
CHECKED BY : D. Westhoff
DATE : September 2011

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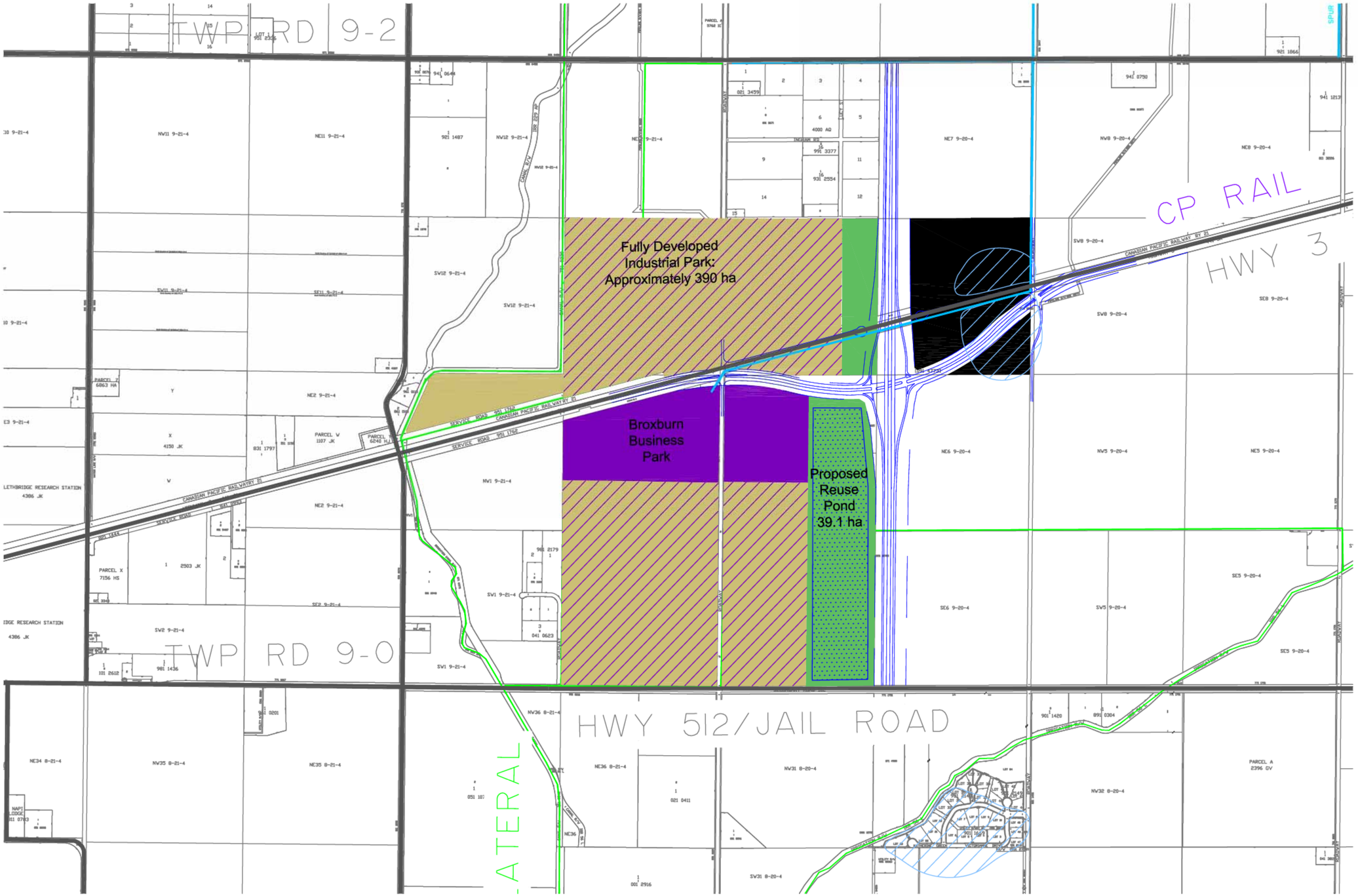

LEGEND

- SMRID CANAL
- SMRID DRAIN
- ROAD
- FREQUENTLY FLOODED AREAS

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Drawing SWM05 Water Re-use Opportunities

DRAWN BY : K. Sullivan
CHECKED BY : D. Westhoff
DATE : September 2011

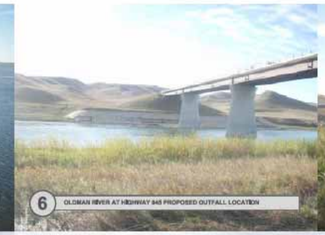
1 STORM PUMP STATION AT MAIN EAST STORM POND


2 MAIN EAST STORM POND


3 BIRDS OF PREY WETLANDS AND INTERPRETIVE CENTRE

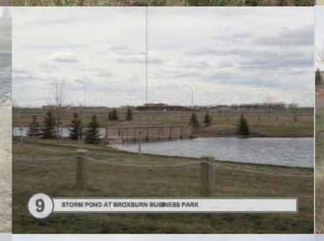

4 BIRDS OF PREY WETLANDS


5 SMIED NORTH EAST RESERVOIR


6 OLDMAN RIVER AT HIGHWAY 845 PROPOSED OUTFALL LOCATION


7 STAFFORD RESERVOIR FROM THE NORTH EAST BANK


8 OUTLET FROM STAFFORD RESERVOIR TO THE MAIN CANAL


9 STORM POND AT BROXBURN BUSINESS PARK


10 SOUTH COALDALE DRAIN WEST OF THE BALLPARK


11 SOUTH COALDALE LATERAL NORTH OF THE BALLPARK


12 EAST RAW WATER RESERVOIR (ABANDONED)


13 WEST RAW WATER RESERVOIR (ABANDONED)


14 STAFFORD RESERVOIR FROM TWP 9-3


15 EXISTING PUMP BETWEEN COALDALE LATERAL AND RAW WATER RESERVOIR


16 SOUTH COALDALE DRAIN BETWEEN LATERAL AND RAW WATER RESERVOIR


17 THE EASTVIEW STORM POND AND 8TH STREET LOOKING SOUTH


18 8TH STREET NORTH OF CPR TRACKS ALONG PROPOSED PIPE ALIGNMENT


19 CHEESE FACTORY DRAIN AT 12TH STREET


20 FLOODING NORTH OF THE BIRDS OF PREY WETLANDS, JUNE 21, 2010


21 STAFFORD RESERVOIR DURING FLOODING CONDITIONS, JUNE 21, 2010


22 FLOODING AT THE CONFLUENCE OF THE MALLOY DRAIN, JUNE 21, 2010


23 AERIAL VIEW OF THE ABANDONED RAW WATER RESERVOIRS, JUNE 21, 2010


24 COALDALE SEWAGE LAGOONS DURING FLOOD EVENT ON JUNE 21, 2010


25 FLOODED FARMLAND DURING THE JUNE 21, 2010 STORM EVENT


26 MAIN EAST (RIGHT) AND EASTVIEW (LEFT) STORM PONDS, JUNE 21, 2010


27 COTTONWOOD SUBDIVISION DURING JUNE 21, 2010 FLOOD EVENT


28 INDUSTRIAL PARK STORM POND DURING JUNE 21, 2010 FLOOD EVENT


29 FLOODING AT HIGHWAYS 845 AND 512 PRIOR TO OVERTOPPING, JUNE 21, 2010


30 BIRDS OF PREY WETLANDS AT SOUTH BERM


31 LOW POINT BETWEEN BIRDS OF PREY WETLAND AND WEST PROPERTY LINE


32 LOOKING NORTH ALONG THE MAIN CANAL AT HIGHWAY 3


33 SOUTH COALDALE DRAIN AT THE COALDALE LATERAL, LOOKING SOUTH


34 DIVERSION STRUCTURE FROM THE COALDALE LATERAL TO THE DRAIN

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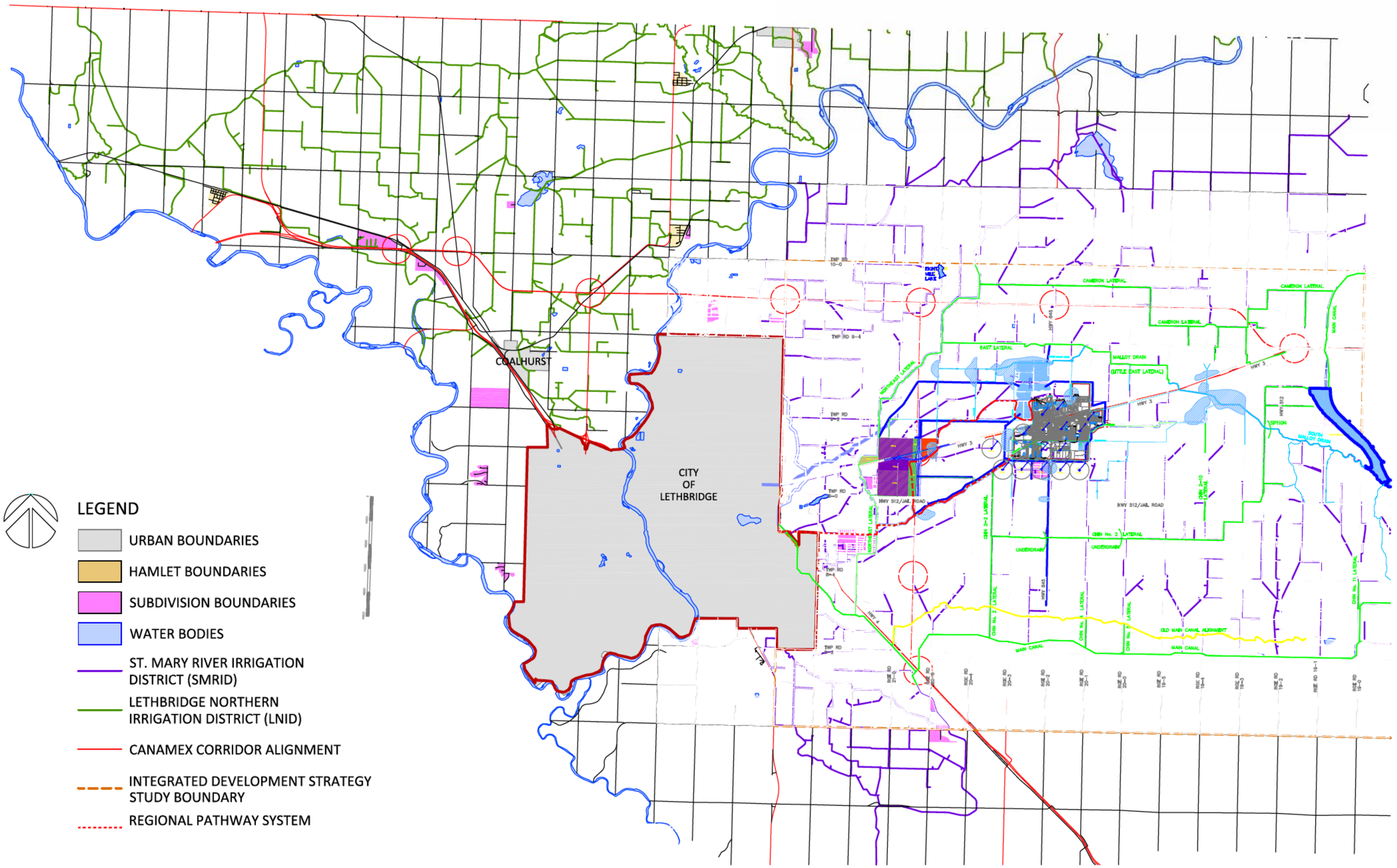
Drawing SWM07
Site Photographs

DRAWN BY : K. Sullivan
CHECKED BY : D. Westhoff
DATE : September 2011

Appendix E - Water Supply and Wastewater

Appendix F - Economic Development Strategy

Appendix G - Regional Pathway System



LEGEND

- URBAN BOUNDARIES
- HAMLET BOUNDARIES
- SUBDIVISION BOUNDARIES
- WATER BODIES
- ST. MARY RIVER IRRIGATION DISTRICT (SMRID)
- LETHBRIDGE NORTHERN IRRIGATION DISTRICT (LNID)
- CANAMEX CORRIDOR ALIGNMENT
- INTEGRATED DEVELOPMENT STRATEGY STUDY BOUNDARY
- REGIONAL PATHWAY SYSTEM

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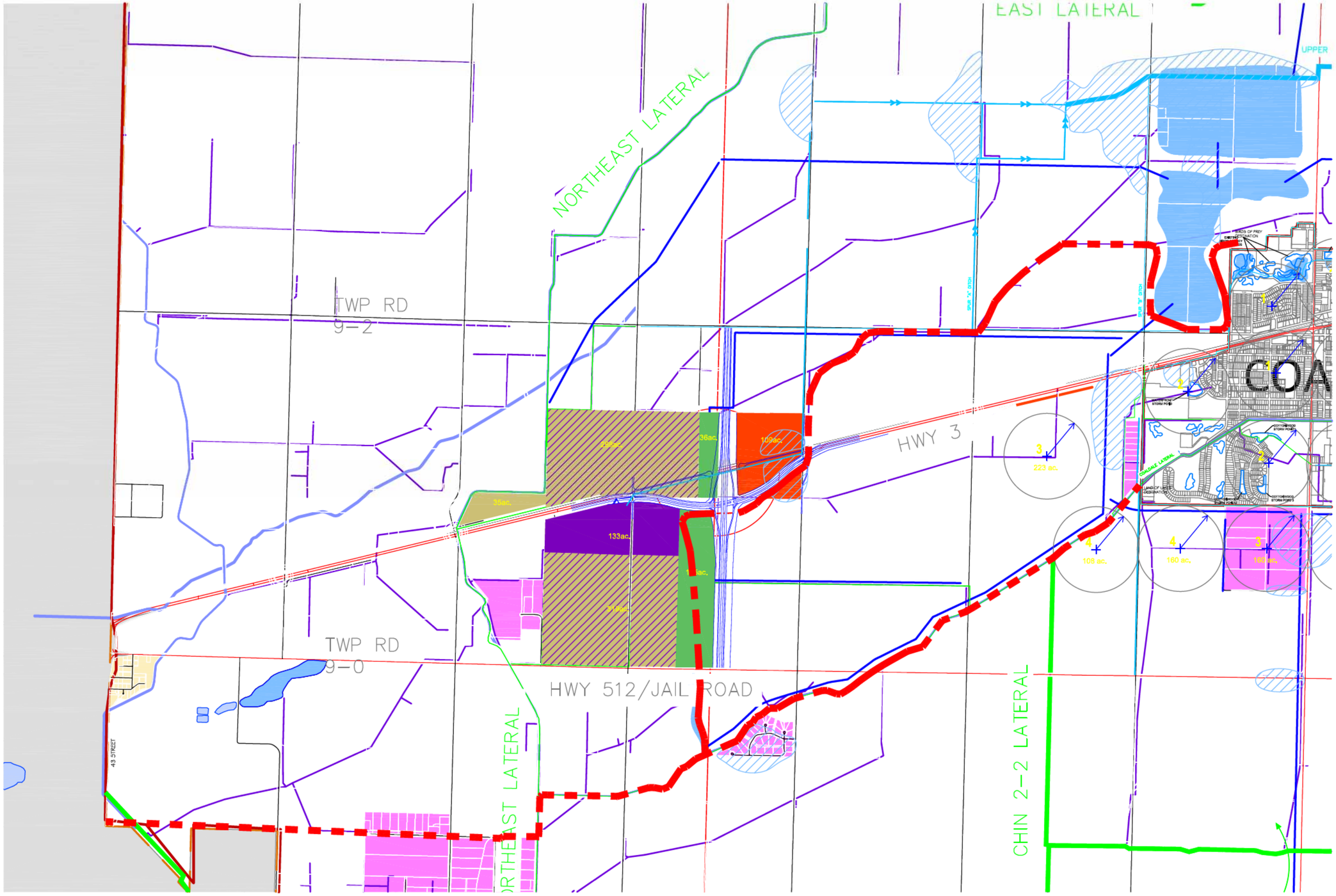
Regional Pathway System

Figure 1



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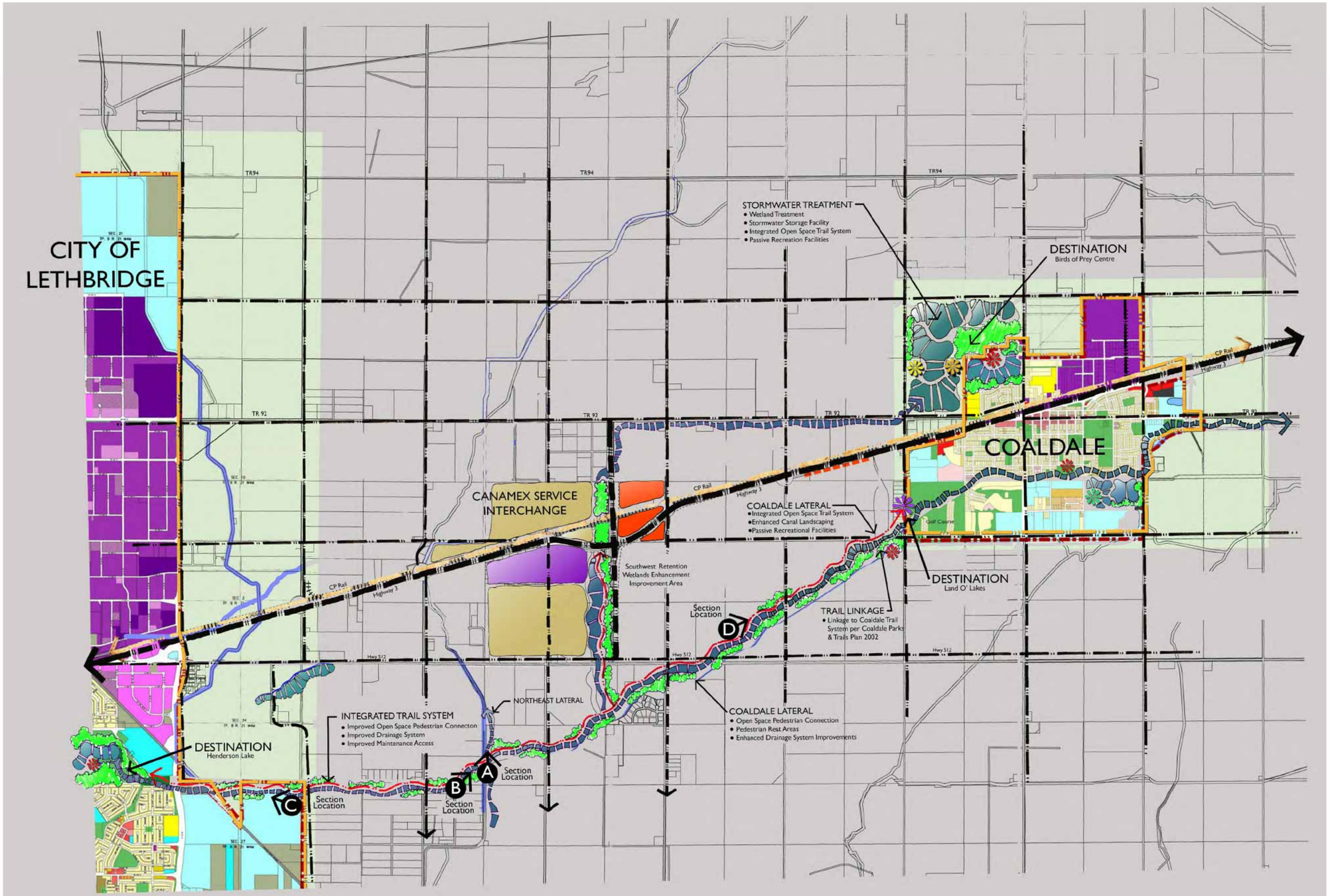
Regional Pathway System

Figure 2

Appendix H - Open Space Planning



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DATE	NO.	BY	REVISION

NO.	BY	DESCRIPTION	DATE

Browning Horrocks Design Inc.

OPEN SPACE/REGIONAL PATH CONNECTION

SCALE :	1:25000
DRAWN BY :	S.W.
CHECKED BY :	G.B.
DATE :	SEP-19-2011

LEGEND

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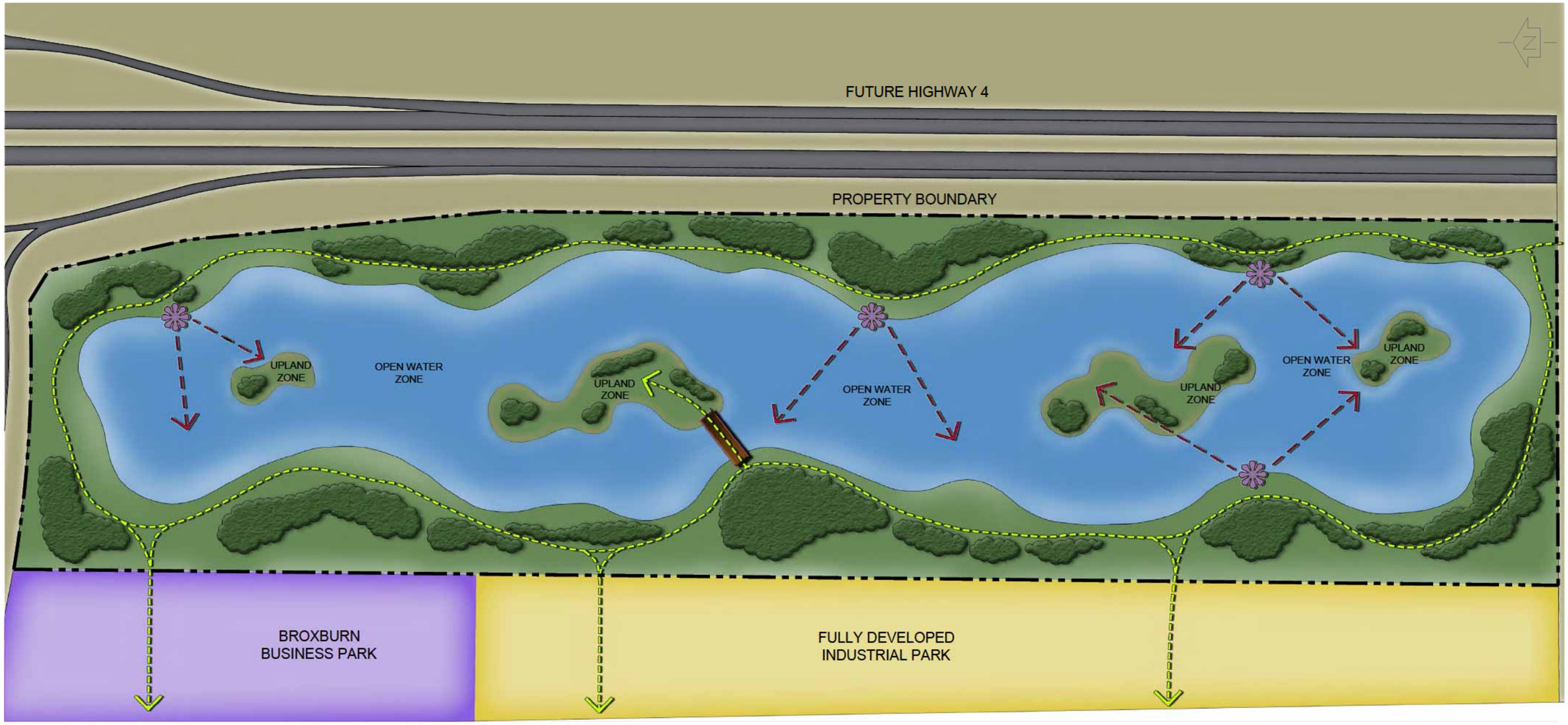
DATE	NO.	BY	REVISION

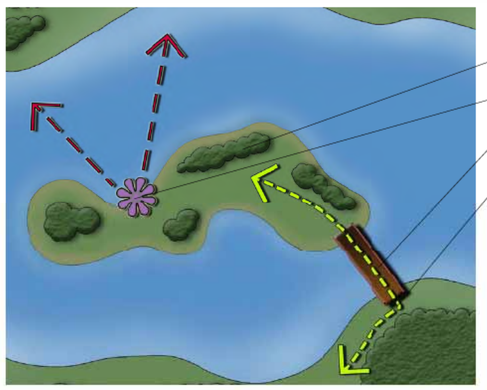
NO.	BY	DESCRIPTION	DATE

Browning Horrocks Design Inc.

BIRDS OF PREY NATURE CENTRE CONCEPTUAL MASTER PLAN

SCALE :	1:2500
DRAWN BY :	S.J.
CHECKED BY :	G.B.
DATE :	SEP-19-2011





LEGEND

- PROPOSED NATIVE PLANTING
- VIEWING POINT
- BRIDGE
- BICYCLE PATH

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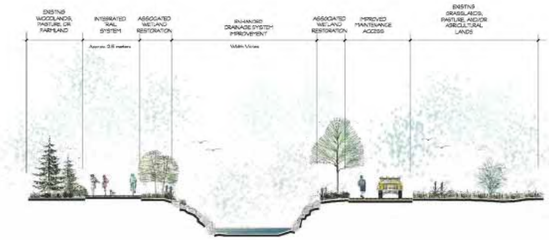
NO.	BY	DESCRIPTION	DATE

Browning Horrocks Design Inc.

PROPOSED STORM WATER REUSE LANDSCAPE CONCEPT

SCALE :	1:2000
DRAWN BY :	S.W.
CHECKED BY :	G.B.
DATE :	SEP-19-2011



SUGGESTED WETLAND PLANT MATERIAL

WOODED WETLANDS:
Deciduous - Poplar and Willow
Coniferous - White Spruce and Larch

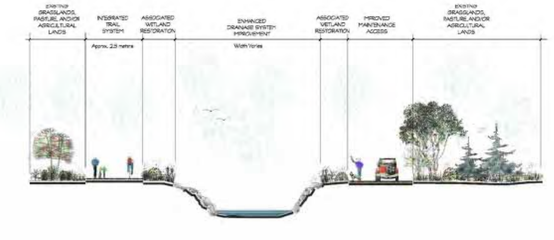
SHRUB WETLANDS:
Dogwood, Saskatoon, Willow

WET MEADOW:
Tufted Hairgrass, Rocky Mountain Fescue, Foxtail Barley, Rough Fescue, Green Needlegrass, Junegrass, Fowl Mannagrass, Bluejoint Reedgrass

MARSH/OPEN WATER:
Creeping Red Fescue, Tall Hairgrass

Integrated Trail System Section 'A'

Not to Scale



SUGGESTED WETLAND PLANT MATERIAL

WOODED WETLANDS:
Deciduous - Poplar and Willow
Coniferous - White Spruce and Larch

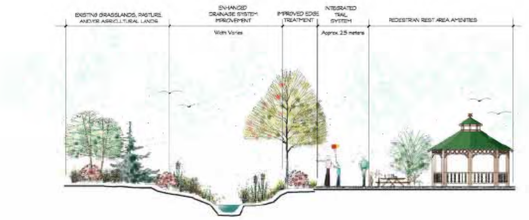
SHRUB WETLANDS:
Dogwood, Saskatoon, Willow

WET MEADOW:
Tufted Hairgrass, Rocky Mountain Fescue, Foxtail Barley, Rough Fescue, Green Needlegrass, Junegrass, Fowl Mannagrass, Bluejoint Reedgrass

MARSH/OPEN WATER:
Creeping Red Fescue, Tall Hairgrass

Integrated Trail System Section 'B'

Not to Scale



SUGGESTED WETLAND PLANT MATERIAL

WOODED WETLANDS:
Deciduous - Poplar and Willow
Coniferous - White Spruce and Larch

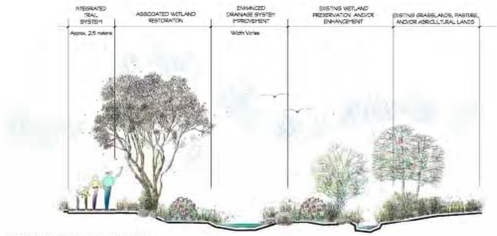
SHRUB WETLANDS:
Dogwood, Saskatoon, Willow

WET MEADOW:
Tufted Hairgrass, Rocky Mountain Fescue, Foxtail Barley, Rough Fescue, Green Needlegrass, Junegrass, Fowl Mannagrass, Bluejoint Reedgrass

MARSH/OPEN WATER:
Creeping Red Fescue, Tall Hairgrass

Integrated Trail System Section 'C'

Not to Scale



SUGGESTED WETLAND PLANT MATERIAL

WOODED WETLANDS:
Deciduous - Poplar and Willow
Coniferous - White Spruce and Larch

SHRUB WETLANDS:
Dogwood, Saskatoon, Willow

WET MEADOW:
Tufted Hairgrass, Rocky Mountain Fescue, Foxtail Barley, Rough Fescue, Green Needlegrass, Junegrass, Fowl Mannagrass, Bluejoint Reedgrass

MARSH/OPEN WATER:
Creeping Red Fescue, Tall Hairgrass

Integrated Trail System Section 'D'

Not to Scale

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NO.	BY	DESCRIPTION	DATE

Browning Horrocks Design Inc.

REGIONAL PATH SECTIONS

SCALE :	N.T.S.
DRAWN BY :	S.W.
CHECKED BY :	G.B.
DATE :	SEP-19-2011

Appendix J - Architectural Form and Character

Appendix K - Biophysical Overview and Data Summary

Appendix K_1

Summary Table of Biophysical Information

Table 1: Summary Table of Biophysical Information

Biophysical Component	Deliverable Attached	Source of Available Data	Applications/Limitations/Follow-up
General			
Land Cover	• Map of Land Cover	• Provided by the County of Lethbridge on October 13, 2010. • Original spatial data from Agriculture and Agri-Food Canada. • Map created in 2009. • Data inputs included Landsat-5 TM or Landsat-7 ETM+ satellite imagery, airphotos, databases, soils information etc. from 1998 to 2003. • Small features (less than 0.4ha) may have been omitted from classification. • Overall accuracy was determined to be 82% based on analysis completed with independent ground reference information.	• Provides a general indication of the distribution and extent of existing vegetation communities and habitats. • May require ground-truthing to confirm accuracy for further land use planning applications.
	• Map of Soils	• Provided by the County of Lethbridge. • Map created in 2009. • Developed using AGRASID (Version 3.0).	• May require ground-truthing to confirm accuracy for further land use planning applications.
	• Contour Data	• AutoCAD file	• May require ground-truthing to confirm accuracy for further land use planning applications.

Biophysical Component	Deliverable Attached	Source of Available Data	Applications/Limitations/Follow-up
Land Cover	• Photo mosaic	• Provided by the County of Lethbridge on Oct. 13, 2010. • Orthorectified imagery, flown in June 2009. • Scale 1:30,000 – 0.5m pixel with 1 to 1.4m accuracy.	• May be applied to develop vegetation community and/or habitat maps • May be applied in evaluating impacts to habitat available for species and communities of special management concern • May be applied in the development of a wetland and riparian land inventory of the Study Area
Plants			
Potential Special Status Plants	• List of species with the potential to occur in the Study Area based on Natural Subregion	• Alberta Conservation Information Management System (ACMIS) (http://www.tpr.alberta.ca/parks/heritageinfocentre/datarequests/default.aspx) • Excel file	• The standard search of the ACIMS database is very broad as it is completed with reference to the Natural Subregion (“Mixedgrass”) • Further evaluation of the potential for rare plants may be completed based on available suitable habitat, GIS-based modeling, or with field surveys for rare plants
Potential Rare ecological communities	• List of communities with the potential to occur in the Study Area based on Natural Region	• ACMIS Tracked Elements Listed by Natural Subregions (http://www.tpr.alberta.ca/parks/heritageinfocentre/datarequests/default.aspx) • Excel file	• The standard search of the ACIMS database is very broad as it is completed with reference to the Natural Region(“Grassland”) • Further evaluation of the potential for rare ecological communities may be completed based on available suitable habitat, GIS-based modeling, or with field surveys for rare ecological communities

Biophysical Component	Deliverable Attached	Source of Available Data	Applications/Limitations/Follow-up
Observed special status plants and rare ecological communities	• Map of current records	• ACMIS data request (http://www.tpr.alberta.ca/parks/heritageinfocentre/datarequests/default.aspx) • ACMIS ESRI shapefile	• Data gaps are expected as many areas in Alberta have never been comprehensively surveyed and an ACMIS data search is not intended as a final statement on the presence, absence, or condition of such elements in a given area. • Further evaluation of the potential for rare plants or rare ecological communities may be completed based on available suitable habitat, GIS-based modeling, or with field surveys
Wildlife			
Potential Wildlife species	• List of wildlife species, including their federal and provincial status with the potential to occur and whether they have been observed within or in the vicinity of the Study Area	• ACMIS Tracked Elements Listed by Natural Subregions (http://www.tpr.alberta.ca/parks/heritageinfocentre/datarequests/default.aspx) • Western Reptiles and Amphibians, 3rd edition (Stebbins, 2003). • Mammals of Alberta (Pattie and Fisher, 1999). • The Amphibians and Reptiles of Alberta (Russell and Bauer, 2000). • The Atlas of Breeding Birds in Alberta (1992). • The Federation of Alberta Naturalists Field Guide to Alberta Birds (McGillivray and Semenchuk, 1998).	• Provides a general indication of the abundance and diversity of wildlife in the Study Area • Provides information on wildlife federally or provincially listed as species of special management concern • Further evaluation may be completed to confirm species presence based on available habitat, GIS-based modeling, or field survey.

Biophysical Component	Deliverable Attached	Source of Available Data	Applications/Limitations/Follow-up
Observed special status wildlife species	• List of wildlife species, including their federal and provincial status with the potential to occur and whether they have been observed within or in the vicinity of the Study Area	• Fisheries and Wildlife Management System (FWMIS) (http://www.srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/FisheriesWildlifeManagementInformationSystem/Default.aspx) • Interactive Mapping Framework Query	• Data gaps are expected as FWMIS does not contain a complete record of fish and wildlife observations available. Information accessible through FWMIS is not intended to be a definitive statement on the presence, absence, or status of a species within a given area, nor is it a substitute for on-site surveys. • Further evaluation may be completed to confirm species presence based on available habitat, GIS-based modeling, or field surveys.
Observed special status fish species	• List of fish species that have been observed in the Study Area including their federal and provincial status	• Fisheries and Wildlife Management System (FWMIS) (http://www.srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/FisheriesWildlifeManagementInformationSystem/Default.aspx) • Interactive Mapping Framework Query	
Species at Risk Habitat Suitability Indices	• no deliverable attached	• MULTISAR (Multiple Species at Risk) • Reports available by Section or quarter section	• 17 species are included in the HSI Model, which have been selected because: (1) they are a representative of a group of similar species, (2) they possess narrow ecological or habitat requirements, (3) they have a high sensitivity to change, or (4) they are valued as a "keystone species". • Models have not been field truthed, and as such, should be treated as preliminary. • Models have limitations due to the coarse resolution of the available databases used in the modeling and/or the limited data available (i.e. key data regarding available habitat features may not exist).

Biophysical Component	Deliverable Attached	Source of Available Data	Applications/Limitations/Follow-up
Environmental Significant Areas (ESA)			
ESA	• Map of ESAs in the Study Area • Description of ESAs within or adjacent to the Study Area	• Environmentally Significant Areas, Provincial Update 2009 (http://tpr.alberta.ca/parks/heritageinfocentre/environsigareas/default.aspx) • ESRI shapefile • Environmentally Significant Areas, Provincial Update PDF report and map (Fiera Biological Consulting. 2009)	• Data gaps are expected as the identification of ESAs occurred at a very large scale and should be considered a coarse-scale assessment of environmental values in the Province and the Study Area respectfully. • Follow-up evaluation is needed to confirm the absence of ESAs from the Study Area based on available data on sensitive biophysical features of the area.

Appendix K_2

Natural Regions and Subregions of Alberta

Appendix K_3

Base Map

Appendix K_4

Soils Map

Appendix K_5

Land Cover Map

Appendix K_6

Potential and Observed Special Status Plants, and Rare Ecological Communities, Within or Adjacent to the Study Area

Potential and Observed Special Status Plants Within and Adjacent the Study Area.

Common Name	Scientific Name	Status				Observed	Location
		AB	COSEWIC	SARA	S Rank		
Acadian Hairstreak	*Satyrium acadicum*	UN			S2	2007	N of Study Area
Annual Skeletonweed	*Shinnersoseris rostrata*	MBAR					
Biscuit-root	*Lomatium cous*	MBAR					
Blunt-leaved Yellow Cress	*Rorippa curvipes var. truncata*						
Broad-leaved Arrowhead	*Sagittaria latifolia*	MBAR					
Buff Fleabane	*Erigeron ochroleucus var. scribneri*						
Californian Amaranth	*Amaranthus californicus*	MBAR					
Chaffweed	*Anagallis minima*	MBAR					
Clammy hedge-hyssop	*Gratiola neglecta*	SEN					
Clammyweed	*Polanisia dodecandra*	MBAR			S2	1987 and 1997	N and W of Study Area
Corymbose everlasting	*Antennaria corymbosa*	MBAR					
desert firedot lichen	*Caloplaca trachyphylla*				S2	1980	W of Study Area
Dowingia	*Dowingia laeta*				S2	1978	SW of Study Area
Downingia	*Downingia laeta*	MBAR					
Dwarf Woollyheads	*Psilocarphus brevissimus var. brevissimus*		EN	EN			
Early Buttercup	*Ranunculus glaberrimus*	MBAR					
Flowering-quillwort	*Lilaea scilloides*	MBAR					
Goosefoot	*Chenopodium incanum*	MBAR					

Common Name	Scientific Name	Status				Observed	Location
		AB	COSEWIC	SARA	S Rank		
Greenthread	*Thelesperma subnudum var. marginatum*						
Hairy Pepperwort	*Marsilea vestita*	MBAR			S2	1967	SW of Study Area
Hare-footed Locoweed	*Oxytropis lagopus var. conjugans*		SC	SC			
Hawk's-beard	*Crepis atribarba*	MBAR					
Lance-leaved Lungwort	*Mertensia lanceolata*	MBAR					
Leafy Pondweed	*Potamogeton foliosus*	S					
Linear-leaved Scorpionweed	*Phacelia linearis*	MBAR					
Low Cinquefoil	*Potentilla plattensis*	MBAR					
low Townsendia	*Townsendia exscapa*	MBAR					
Low Yellow Evening-primrose	*Oenothera flava*	MBAR					
Moquin's Sea-blite	*Suaeda moquinii*						
Nebraska Sedge	*Carex nebrascensis*	MBAR	NAR				
Nevada Bluegrass	*Poa nevadensis*						
Nevada Rush	*Juncus nevadensis*	MBAR					
Northern Bladderpod	*Lesquerella arctica var. purshii*						
Pale Blue-eyed Grass	*Sisyrinchium septentrionale*	SEN					
Picradeniopsis	*Picradeniopsis oppositifolia*	MBAR			S1	1940, 1969 and 1978	Centre of Study Area, W of Study Area
Pinesap	*Monotropa hypopithys*	MBAR					
Poison Suckleya	*Suckleya suckleyana*	MBAR			S1S2	1950 and 1964	SE, E and S of Study Area
Powell's Salbush	*Atriplex powellii*	SEN			S1	2004	E of Study Area
Prairie Cord Grass	*Spartina pectinata*	MBAR					
Prairie False Dandelion	*Nothocalais cuspidata*	MBAR					

Common Name	Scientific Name	Status				Observed	Location
		AB	COSEWIC	SARA	S Rank		
Prairie Wedge Grass	*Sphenopholis obtusata*	MBAR					
Prickly Milk Vetch	*Astragalus kentrophyta var. kentrophyta*						
Red three-awn	*Aristida purpurea var. longiseta*				S2	1978 and 1997	W of Study Area
Rockstar	*Lithophragma glabrum*	MBAR					
Saltbush	*Atriplex canescens*	S					
Salt-marsh Sand Spurry	*Spergularia salina*	MBAR			S2S3	2008	SE of Study Area
Shrubby Evening-primrose	*Calylophus serrulatus*	MBAR			S2	1997	W of Study Area
Side-oats Grama	*Bouteloua curtipendula*				S1	1955	W of Study Area
Slender Cress	*Rorippa tenerrima*	MBAR					
Slender Spikerush	*Eleocharis elliptica*	UN					
Small Baby-blue-eyes	*Nemophila breviflora*	MBAR					
Small-flowered Hawk's-beard	*Crepis occidentalis*	MBAR			S2	Unknown	W of Study Area
Smooth Boisduvalia	*Boisduvalia glabella*	MBAR					
Smooth Narrow-leaved Goosefoot	*Chenopodium subglabrum*	MBAR	TH	TH	S1	1988	N and NE of Study Area along Oldman River
Smooth Sweet Cicely	*Osmorhiza longistylis*	MBAR					
Soapweed	*Yucca glauca*	AR	TH	TH	S1	2000	W of Study Area
Spatulate-leaved Heliotrope	*Heliotropium curassavicum*	SEN					
Spreading Yellow Cress	*Rorippa sinuata*	MBAR			S1	1964	SW of Study Area
Tufted Hymenopappus	*Hymenopappus filifolius*	MBAR					
Two-leaved Waterweed	*Elodea bifoliata*	MBAR					
Two-leaved Waterweed	*Elodea biofoliata*	MBAR			S2	2004	S of Study Area

Common Name	Scientific Name	Status				Observed	Location
		AB	COSEWIC	SARA	S Rank		
Upland Evening-primrose	*Camissonia andina*	MBAR					
Water Speedwell	*Veronica catenata*	MBAR					
Waterpod	*Ellisia nyctelea*	MBAR			S2	2004	S of Study Area
Waterwort	*Elatine triandra*	MBAR					
Western Blue Flag	*Iris missouriensis*	AR	SC	TH	S2	1979 and 2007	NW of Study Area
Western False Gromwell	*Onosmodium molle*	MBAR					
Whitlow-grass	*Draba reptans*	MBAR			S1S2	1986 and 1987	N and W of Study Area
Widgeon-grass	*Ruppia cirrhosa*	SEN			S1	1976	S of Study Area
Yellow Cress	*Rorippa curvipes*	MBAR			SU	2004	S of Study Area
Yellow Monkeyflower	*Mimulus guttatus*	S					

Status:
AB, COSEWIC and SARA Ranking: S = Secure; SEN = Sensitive; SC = Special Concern; MBAR = May Be At Risk; AR = At Risk; EN = Endangered; TH = Threatened; UN = Undetermined; EX = Exotic/Alien; EP = Extirpated.

S Ranking: S = provincial; 1 = five or fewer occurrences (i.e. hectares); 2 = 6 to 20 occurrences; 3 = vulnerable because it is very rare and local throughout its range, is found only within a restricted range, or is threatened by some factor of its biology or environment; 4 = apparently secure, generally common and widespread, but may be rare in parts of its range; 5 = demonstrably secure because of it is widespread and abundant, may be rare in parts of its range but in general, is common throughout; ? = denotes uncertainty in the ranking

Source: ACMIS Tracked Elements Listed by Natural Subregions (http://www.tpr.alberta.ca/parks/heritageinfocentre/datarequests/default.aspx); ACIMS data search (http://www.tpr.alberta.ca/parks/heritageinfocentre/datarequests/searchdata.aspx).

Potential Rare Ecological Communities Associated with the Mixed Grassland Natural Subregion.

Element Scientific Name	Element Common Name	Status			Occurrence Details
		Alberta Rank	National Rank	Global Rank	
Schizachyrium scoparium - Festuca campestris	little bluestem - mountain rough fescue	S1?	NNR		On sub-irrigated channel deposits in the Mixedgrass and Foothills Fescue Natural Subregions.
Juniperus horizontalis / Carex pensylvanica - Eriogonum flavum	creeping juniper / sun-loving sedge - yellow umbrella-plant	S1S2	NNR		In badlands that are made up of bedrock exposures of marine shales of the Bearpaw formation; occurs on badland pediments that have formed mid-slope, below the crest of slope and above benches and valley bottems; slopes are prone to erosion due to soft materials and lack of vegetation.
Crataegus chrysocarpa / Heracleum lanatum - Urtica dioica - Viola canadensis	round-leaved hawthorn / cow parsnip - common nettle - western Canada violet	S1S2	NNR		Found on slopes immediately below a spring or seep; may also occur on alluvial terraces along streams and rivers; stands on slopes tend to be in a concave spot, mid slope and have been documented various aspects, but primarily on south-facing slopes; water table is close to the surface
Artemisia longifolia - Chrysothamnus nauseosus	long-leaved sagewort - rabbitbrush	S1	NNR		Found on badland slopes; vegetation is scattered on unconsolidated bedrock, usually sandstone or shale.
Pascopyrum smithii - Atriplex nuttallii	western wheat grass - atriplex	S1	NNR		Found on badland formations, on moderate northeast facing coulee slopes; characterized by having 75 - 80% bare ground; appears to be significant habitat for short horned lizard.
Artemisia cana / Festuca campestris - Stipa curtiseta	silver sagebrush / mountain rough fescue - western porcupine grass	S1?	NNR		Found on moderately steep, west facing slope.

Element Scientific Name	Element Common Name	Status			Occurrence Details
		Alberta Rank	National Rank	Global Rank	
Aristida purpurea grassland	red three-awn grassland	S1	NNR		A small patch community, found on sleep south-facing slopes, mid-slope although also noted along ridge tops; associated substrate is light, sandy and stony.

Status:
S = provincial; N = national; G = global; 1 = five or fewer occurrences (i.e. hectares); 2 = 6 to 20 occurrences; 3 = vulnerable because it is very rare and local throughout its range, is found only within a restricted range, or is threatened by some factor of its biology or environment; 4 = apparently secure, generally common and widespread, but may be rare in parts of its range; 5 = demonstrably secure because of it is widespread and abundant, may be rare in parts of its range but in general, is common throughout; ? = denotes uncertainty in the ranking

Source: ACMIS Tracked Elements Listed by Natural Subregions (http://www.tpr.alberta.ca/parks/heritageinfocentre/datarequests/default.aspx); ACMIS Community Tracking List Report 2010 (http://www.tpr.alberta.ca/parks/heritageinfocentre/ecocommunities/docs/ctl2010.pdf.

Appendix K_7

Potential and Observed Wildlife and Fish Species Within or Adjacent to the Study Area

Potential and Observed wildlife species within and adjacent to the Study Area.

AMPHIBIANS AND REPTILES					
Common Name	**Scientific Name**	**Status**			**FWMIS Observations**
		AB	**COSEWIC**	**SARA**	
Tiger Salamander	*Ambystoma tigrinum*	S			
Northern Leopard Frog	*Rana pipiens*	AR	SC	SC	✓
Great Plains Toad	*Bufo cognatus*	MBAR	SC	SC	
Plains Spadefoot	*Spea bombifrons*	MBAR			✓
Canadian Toad	*Bufo hemiophrys*	MBAR			
Boreal Chorus Frog	*Pseudacris maculata*	S			
Red-sided Garter Snake	*Thamnophis sirtalis*	SEN			
Wandering Garter Snake	*Thamnophis elegans*	SEN			✓
Bullsnake	*Pituophis catenifer*	SEN			✓
Plains Garter Snake	*Thamnophis radix*	SEN			
Prairie Rattlesnake	*Crotalus viridis*	MBAR			✓
Western Painted Turtle	*Chrysemys picta*	SEN			✓
MAMMALS					
Common Name	**Scientific Name**	**Status**			**FWMIS Observations**
		AB	**COSEWIC**	**SARA**	
White-tailed Deer	*Odocoileus virginianus*	S			
Pronghorn	*Antilocapra americana*	SEN			
Mule Deer	*Odocoileus hemionus*	S			
Long-tailed Weasel	*Mustela frenata*	MBAR			✓
Mink	*Mustela vison*	S			
Least Weasel	*Mustela nivalis*	S			
American Badger	*Taxidea taxus*	SEN			
Striped Skunk	*Mephitis mephitis*	S			
Common Raccoon	*Procyon lotor*	S			
Coyote	*Canis latrans*	S			
Swift Fox	*Vulpes velox*	AR	EN	EN	
Common Porcupine	*Erethizon dorsatum*	S			

Common Name	Scientific Name	Status			FWMIS Observations
		AB	COSEWIC	SARA	
Western Jumping Mouse	*Zapus princeps*	S			
Prairie Vole	*Microtus ochrogaster*	S			
Sagebrush Vole	*Lemmiscus curtatus*	S			
Long-tailed Vole	*Microtus longicaudus*	S			
House Mouse	*Mus musculus*	EX			
Deer Mouse	*Peromyscus maniculatus*	S			
Muskrat	*Ondatra zibethicus*	S			
Western Harvest Mouse	*Reithrodontomys megalotis*	UN	EN	EN	
Meadow Vole	*Microtis pennsylvanicus*	S			
Bushy-tailed Woodrat	*Neotoma cinerea*	S			
Northern Grasshopper Mouse	*Onychomys leucogaster*	S			
Beaver	*Castor canadensis*	S			
Olive-backed Pocket Mouse	*Perognathus fasciatus*	SEN			
Ord's Kangaroo Rat	*Dipodomys ordii*	AR	EN	EN	
Northern Pocket Gopher	*Thomomys talpoides*	S			
Yellow-bellied Marmot	*Marmota flaviventris*	S			
Thirteen-lined Ground Squirrel	*Spermophilus tridecemlineatus*	UN			
Richardson's Ground Squirrel	*Spermophilus richardsonii*	S			
White-tailed Jack Rabbit	Lepus townsendii	S			
Nuttall's Cottontail	Sylvilagus nuttallii	S		SC	
Snowshoe Hare	Lepus americanus	S			
Hoary Bat	*Lasiurus cinereus*	SEN			✓
Red Bat	*Lasiurus borealis*	SEN			
Long-legged Bat	*Myotis volans*	UN			

Common Name	Scientific Name	Status			FWMIS Observations
		AB	COSEWIC	SARA	
Long-eared Bat	*Myotis evotis*	S			✓
Western Small-footed Bat	*Myotis ciliolabrum*	SEN			✓
Little Brown Bat	*Myotis lucifugus*	S			
Big Brown Bat	*Eptesicus fuscus*	S			
Silver-haired Bat	*Lasionycteris noctivagans*	SEN			
Dusky Shrew	*Sorex monticolus*	S			
Prairie Shrew	*Sorex haydeni*	S			

BIRDS

Common Name	Scientific Name	Status			FWMIS Observations
		AB	COSEWIC	SARA	
Eared Grebe	*Podiceps nigricollis*	S			
Pied-billed Grebe	*Podilymbus podiceps*	SEN			
Clark's Grebe	*Aechmophorus clarkii*	MBAR			
Western Grebe	*Aechmophorus occidentalis*	SEN			
Red-necked Grebe	*Podiceps grisegena*	S			
Horned Grebe	*Podiceps auritus*	SEN	SC		
American White Pelican	*Pelecanus erythrorhynchos*	SEN			✓
Double-crested Cormorant	*Phalacrocorax auritus*	S			
American Bittern	*Botaurus lentiginosus*	SEN			
Great Blue Heron	*Ardea herodias*	SEN			
Black-crowned Night-heron	*Nycticorax nycticorax*	SEN			
White-faced Ibis	*Plegadis chihi*	SEN			
Mallard	*Anas platyrhynchos*	S			
American Green-winged Teal	*Anas crecca*	SEN			
Redhead	*Aythya americana*	S			
American Wigeon	*Anas americana*	S			

Common Name	Scientific Name	Status			FWMIS Observations
		AB	COSEWIC	SARA	
Blue-winged Teal	*Anas discors*	S			
Bufflehead	*Bucephala albeola*	S			
Northern Shoveler	*Anas clypeata*	S			
Common Merganser	*Mergus merganser*	S			
Mallard	*Anas platyrhynchos*	S			
Common Goldeneye	*Bucephala clangula*	S			
Lesser Scaup	*Aythya affinis*	SEN			
Canada Goose	*Branta canadensis*	S			
Hooded Merganser	*Lophodytes cucullatus*	S			
Canvasback	*Aythya valisineria*	S			
Gadwall	*Anas strepera*	S			
Ruddy Duck	*Oxyura jamaicensis*	S			
Cinnamon Teal	*Anas cyanoptera*	S			
Northern Pintail	*Anas acuta*	SEN			
Wood Duck	*Aix sponsa*	S			
Trumpeter Swan	*Cygnus buccinator*	AR			
White-winged Scoter	*Melanitta fusca*	SEN			
Bald Eagle	*Haliaeetus leucocephalus*	SEN			✓
Ferruginous Hawk	*Buteo regalis*	AR			✓
Sharp-shinned Hawk	*Accipiter striatus*	S			
Swainson's Hawk	*Buteo swainsoni*	SEN			✓
Golden Eagle	*Aquila chrysaetos*	SEN			✓
Northern Harrier	*Circus cyaneus*	SEN			✓
Cooper's Hawk	*Accipiter cooperii*	S			
Red-tailed Hawk	*Buteo jamaicensis*	S			
Peregrine Falcon	*Falco peregrinus*	AR	SC	TH	✓
Prairie Falcon	*Falco mexicanus*	SEN			
Merlin	*Falco columbarius*	S			
American Kestrel	*Falco sparverius*	S			
Sharp-tailed Grouse	*Tympanuchus phasianellus*	SEN			✓
Greater Sage-grouse	*Centrocercus urophasianus*	AR	EN	EN	
Ring-necked Pheasant	*Phasianus colchicus*	EX			
Gray Partridge	*Perdix perdix*	EX			
Sora	*Porzana carolina*	SEN			
American Coot	*Fulica americana*	S			

Common Name	Scientific Name	Status			FWMIS Observations
		AB	COSEWIC	SARA	
Virginia Rail	*Rallus limicola*	UN			
American Golden-plover	*Pluvialis dominica*	S			
Mountain Plover	*Charadrius montanus*	AR	EN	EN	
Killdeer	*Charadrius vociferus*	S			
Semipalmated Plover	*Charadrius semipalmatus*	S			
Black-bellied Plover	*Pluvialis squatarola*	S			
American Avocet	*Recurvirostra americana*	S			
Black-necked Stilt	*Himantopus mexicanus*	SEN			
Willet	*Catoptrophorus semipalmatus*	S			
Wilson's Phalarope	*Phalaropus tricolor*	S			
Spotted Sandpiper	*Actitis macularia*	S			
Marbled Godwit	*Limosa fedoa*	S			
Long-billed Curlew	*Numenius americanus*	SEN	SC	SC	✓
Upland Sandpiper	*Bartramia longicauda*	SEN			
Caspian Tern	*Sterna caspia*	SEN			
Franklin's Gull	*Larus pipixcan*	S			
Forster's Tern	*Sterna forsteri*	SEN			
California Gull	*Larus californicus*	S			
Common Tern	*Sterna hirundo*	S			
Black Tern	*Chlidonias niger*	SEN			
Ring-billed Gull	*Larus delawarensis*	S			
Mourning Dove	*Zenaida macroura*	S			
Rock Pigeon	*Columba livia*	EX			
Black-billed Cuckoo	*Coccyzus erythropthalmus*	UN			
Burrowing Owl	*Athene cunicularia*	AR	EN	EN	✓
Long-eared Owl	*Asio otus*	S			
Short-eared Owl	*Asio flammeus*	MBAR	SC	SC	✓
Great Horned Owl	*Bubo virginianus*	S			
Common Poorwill	*Phalaenoptilus nuttallii*	UN			
Common Nighthawk	*Chordeiles minor*	SEN	TH		

Common Name	Scientific Name	Status			FWMIS Observations
		AB	COSEWIC	SARA	
Ruby-throated Hummingbird	*Archilochus colubris*	S			
Belted Kingfisher	*Ceryle alcyon*	S			
Downy Woodpecker	*Picoides pubescens*	S			
Hairy Woodpecker	*Picoides villosus*	S			
Northern Flicker	*Colaptes auratus*	S			
Alder Flycatcher	*Empidonax alnorum*	S			
Eastern Kingbird	*Tyrannus tyrannus*	S			
Eastern Phoebe	*Sayornis phoebe*	SEN			
Say's Phoebe	*Sayornis saya*	S			
Least Flycatcher	*Empidonax minimus*	SEN			
Western Wood-pewee	*Contopus sordidulus*	S			
Western Kingbird	*Tyrannus verticalis*	S			
Northern Shrike	*Lanius excubitor*	S			
Loggerhead Shrike	*Lanius ludovicianus*	SEN	TH	TH	
Warbling Vireo	*Vireo gilvus*	S			
Black-billed Magpie	*Pica pica*	S			
American Crow	*Corvus brachyrhynchos*	S			
Horned Lark	*Eremophila alpestris*	S			
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S			
Barn Swallow	*Hirundo rustica*	SEN			✓
Tree Swallow	*Tachycineta bicolor*	S			
Violet-green Swallow	*Tachycineta thalassina*	S			
Cliff Swallow	*Petrochelidon pyrrhonota*	S			
Bank Swallow	*Riparia riparia*	S			
Mountain Chickadee	*Poecile gambeli*	S			
Black-capped Chickadee	*Poecile atricapilla*	S			
Marsh Wren	*Cistothorus palustris*	S			

Common Name	Scientific Name	Status			FWMIS Observations
		AB	COSEWIC	SARA	
House Wren	*Troglodytes aedon*	S			
Rock Wren	*Salpinctes obsoletus*	S			
American Robin	*Turdus migratorius*	S			
Mountain Bluebird	*Sialia currucoides*	S			
Brown Thrasher	*Toxostoma rufum*	S			
Gray Catbird	*Dumetella carolinensis*	S			
Northern Mockingbird	*Mimus polyglottos*	S			
European Starling	*Sturnus vulgaris*	EX			
Sprague's Pipit	*Anthus spragueii*	SEN	TH	TH	✓
Cedar Waxwing	*Bombycilla cedrorum*	S			
Yellow-breasted Chat	*Icteria virens*	S			
Yellow Warbler	*Dendroica petechia*	S			
Common Yellowthroat	*Geothlypis trichas*	SEN			
Lark Bunting	*Calamospiza melanocorys*	S			✓
Song Sparrow	*Melospiza melodia*	S			
Grasshopper Sparrow	*Ammodramus savannarum*	SEN			
McCown's Longspur	*Calcarius mccownii*	S	SC	SC	
Spotted Towhee	*Pipilo maculatus*	S			
Baird's Sparrow	*Ammodramus bairdii*	MBAR			
Brewer's Sparrow	*Spizella breweri*	SEN			
Snow Bunting	*Plectrophenax nivalis*	S			
Chestnut-collared Longspur	*Calcarius ornatus*	S			
Clay-colored Sparrow	*Spizella pallida*	S			
Chipping Sparrow	*Spizella passerina*	S			
Savannah Sparrow	*Passerculus sandwichensis*	S			
Vesper Sparrow	*Pooecetes gramineus*	S			
Lark Sparrow	*Chondestes grammacus*	S			
Baltimore Oriole	*Icterus galbula*	SEN			
Western Meadowlark	*Sturnella neglecta*	S			

Common Name	Scientific Name	Status			FWMIS Observations
		AB	COSEWIC	SARA	
Bullock's Oriole	*Icterus bullockii*	S			
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	S			
Brown-headed Cowbird	*Molothrus ater*	S			
Common Grackle	*Quiscalus quiscula*	S			
Red-winged Blackbird	*Agelaius phoeniceus*	S			
Brewer's Blackbird	*Euphagus cyanocephalus*	S			
Bobolink	*Dolichonyx oryzivorus*	SEN			
Pine Grosbeak	*Pinicola enucleator*	S			
Pine Siskin	*Carduelis pinus*	S			
Common Redpoll	*Carduelis flammea*	S			
Evening Grosbeak	*Coccothraustes vespertinus*	S			
Purple Finch	*Carpodacus purpureus*	S			
American Goldfinch	*Carduelis tristis*	S			
House Sparrow	*Passer domesticus*	EX			

Status:
S = Secure; SEN = Sensitive; SC = Special Concern; MBAR = May Be At Risk; AR = At Risk; EN = Endangered; TH = Threatened; UN = Undetermined; EX = Exotic/Alien; EP = Extirpated.

Sources: ACMIS Tracked Elements by Natural Subregions (http://www.tpr.alberta.ca/parks/heritageinfocentre/datarequests/default.aspx; Russell and Bauer (2000); Stebbins (2003); McGillivray and Semenchuk (1998); Pattie and Fisher (1999); FWMIS fish and wildlife report (http://xnet.env.gov.ab.ca/imf/imf.jsp?site=fw_mis_pub); Leo Dune, Alberta Environment, personal communication (2010)

Fish Species Observed Within and in the Vicinity of the Study Area

Common Name	Scientific Name	Status		
		AB	COSEWIC	SARA
Brook Stickleback	*Culaea inconstans*	S		
Brook Trout	*Salvelinus fontinalis*	EX		
Brown Trout	*Salmo trutta*	EX		
Bull Trout	*Salvelinus confluentus*	SEN		
Burbot	*Lota lota*	S		
Cutthroat Trout	*Oncorhynchus clarki*	AR	TH	
Cutthroat Trout X Rainbow Trout	*Oncorhynchus clarki X Oncorhynchus mykiss*	EX		
Emerald Shiner	*Notropis atherinoides*	S		
Fathead Minnow	*Pimephales promelas*	S		
Flathead Chub	*Platygobio gracilis*	S		
Goldeye	*Hiodon alosoides*	S		
Grass Carp				
Lake Chub	*Couesius plumbeus*	S		
Lake Sturgeon	*Acipenser fulvescens*	AR	EN	No Status
Lake Trout	*Salvelinus namaycush*	SEN		
Lake Whitefish	*Coregonus clupeaformis*	S		
Longnose Dace	*Rhinichthys cataractae*	S		
Longnose Sucker	*Catostomus catostomus*	S		
Mooneye	*Hiodon tergisus*	S		
Mountain Sucker	*Catostomus platyrhynchus*	S	NAR	
Mountain Whitefish	*Prosopium williamsoni*	S		
Northern Pike	*Esox lucius*	S		
Pearl Dace	*Margariscus margarita*	UN		
Quillback	*Carpiodes cyprinus*	UN		
Rainbow Trout	*Oncorhynchus mykiss*	MBAR		
River Shiner	*Notropis blennius*	UN		
Sauger	*Sander canadensis*	SEN		
Shorthead Redhorse	*Moxostoma macrolepidotum*	S		
Silver Redhorse	*Moxostoma anisurum*	UN		
Spoonhead Sculpin	*Cottus ricei*	MBAR	NAT	
Spottail Shiner	*Notropis hudsonius*	S		
Trout-Perch	*Percopsis omiscomaycus*	S		
Tullibee (Cisco)	*Coregonus artedi*	S		
Walleye	*Stizostedion vitreum*	S		
White Sucker	*Catostomus commersoni*	S		
Yellow Perch	*Perca flavescens*	S		

Status:

S = Secure; SEN = Sensitive; SC = Special Concern; MBAR = May Be At Risk; AR = At Risk; EN = Endangered; TH = Threatened; UN = Undetermined; EX = Exotic/Alien; EP = Extirpated

Source: Fisheries & Wildlife Information System
(http://www.srd.alberta.ca/ManagingPrograms/FishWildlifeManagement/FisheriesWildlifeManagementInformationSystem/Default.aspx)

Appendix K_8

Environmentally Significant Areas in the Study Area

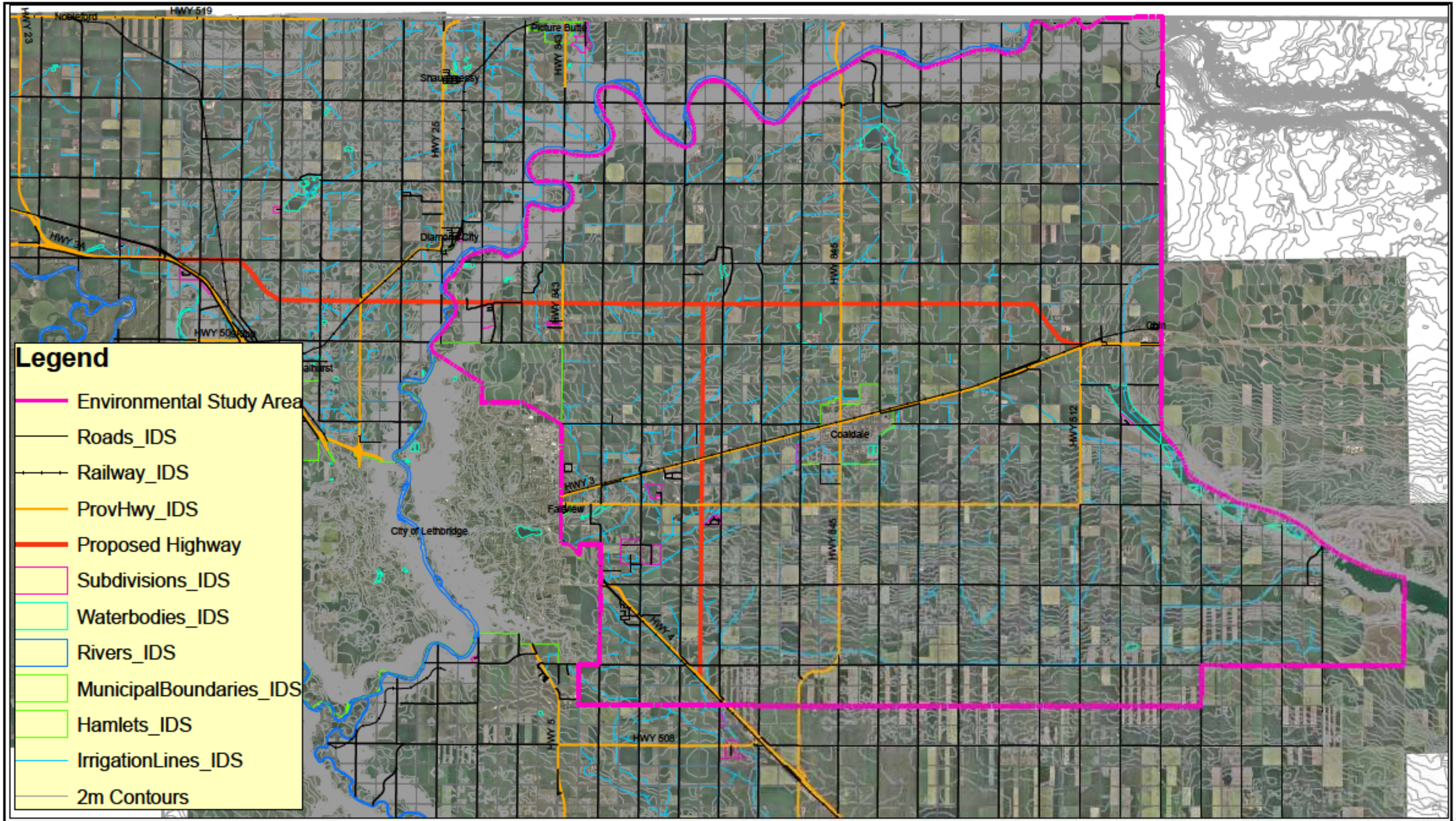
Environmentally Significant Areas in the Study Area

ESA	Description	Significance Level	Criteria	Species Found
291	Mixed Grassland, Foothills Fescue, Montane	National	• Contains 31 elements of conservation concern; • Contains rare or unique landforms • Contains habitat for focal species; • Contains important wildlife habitat; • Contains intact riparian areas and riparian areas along the six major rivers; • Contains large natural areas	Ferruginous Hawk, Western Burrowing Owl, Peregrine Falcon, Lake Sturgeon, River Shiner, Silver Redhorse, Yellow-bellied Marmot, American Pellitory, Clammyweed, Common Tickseed, Greenthread, Hairy Pepperwort, Linear-leaved Scorpionweed, Low Townsendia, Pale Blue-eyed Grass, Picradeniopsis, Prairie Wedge Grass, Red Three-awn, Shrubby Evening-primrose, Small Baby-blue-eyes, Small-flowered Hawk's-bread, Soapweed, Spatulate-leaved Helitrope, Spreading Yellow Cress, Water Speedwell, Waterpod, Western False Gromwell, Western Ribgrass
294	Dry Mixed Grassland, Mixed Grassland	National	• Contains 14 elements of conservation concern; • Contains habitat for focal species; • Contains important wildlife habitat; • Contains intact riparian areas and riparian areas along the six major rivers; • Contains large natural areas	Great Plains Toad, Leopard Frog, Ferruginous Hawk, Western Burrowing Owl, Lake Sturgeon, River Shiner, Sliver Redhorse, Acadian Hairstreak, Oslar's Roadside-skipper, Rocky Mountain Dottled Blue, Ruddy Copper, Woodland Skipper, Hoary Bat, Clammyweed, *Draba reptans*, Smooth Narrow-leaved Goosefoot

Source: Environmentally Significant Areas, Provincial Update 2009
(http://tpr.alberta.ca/parks/heritageinfocentre/environsigareas/default.aspx)

Appendix K_9

Rare Plant, Rare Community and Environmentally Significant Areas Map



CLIENT: COUNTY OF LETHBRIDGE
TOWN OF COALDALE

Westhoff Engineering Resources, Inc.
Land & Water Resources Management Consultants

PROJECT: INTEGRATED DEVELOPMENT STRATEGY

TITLE: BASE MAP

DATE:	PROJECT No.:	FILE NAME:	FIGURE No.	REV.
02-12-2010	WER110-11	11011F06.mxd	FG01	0

Picture Butte

Coaldale

Lethbridge

Taber

Legend

- Environmental Study Area
- NON_SENSITIVE_EOS_OCT_2010 (ACIMS, 2010)
- SENSITIVE_EOS_TOWNSHIP_OCT_2010 (ACIMS, 2010)
- ESAs2009 (Fiera, 2009)

3 1.5 0 3 Kilometers

N W E S

CLIENT: COUNTY OF LETHBRIDGE
TOWN OF COALDALE

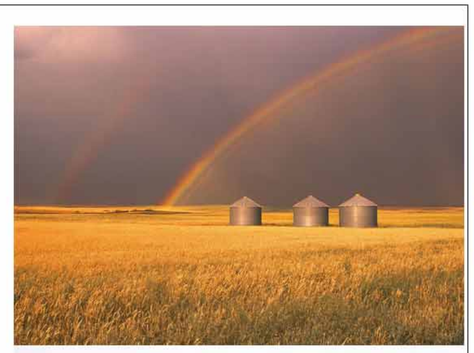
Westhoff Engineering Resources, Inc.
Land & Water Resources Management Consultants

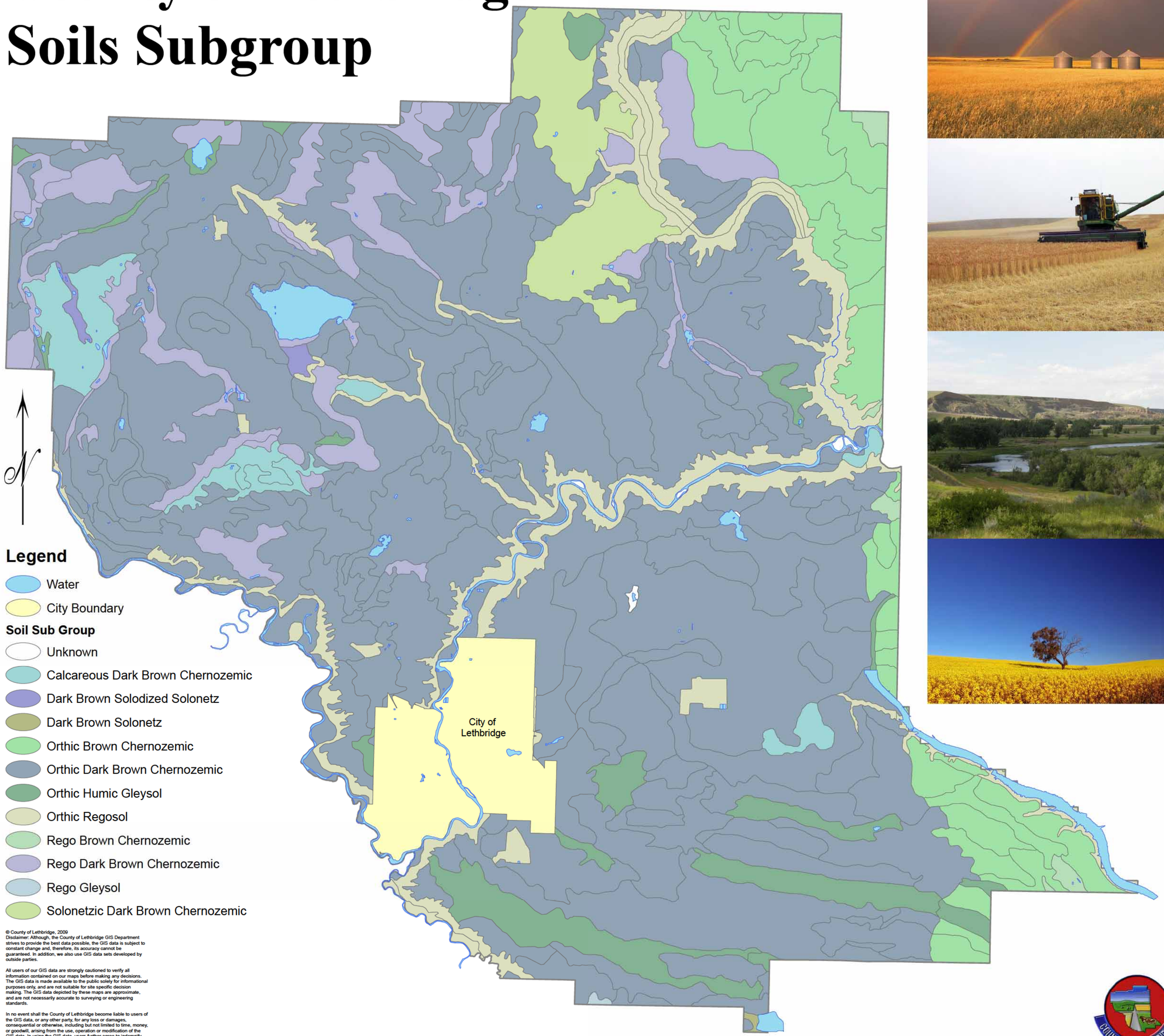
PROJECT: INTEGRATED DEVELOPMENT STRATEGY

TITLE: PROVINCIAL DATABASE SEARCH RESULTS FOR ENVIRONMENTALY SENSITIVE FEATURES

DATE:	PROJECT No.:	FILE NAME:	FIGURE No.	REV.
NOV. 16, 2010	WER110-11	11011F01.mxd	FG03	0

County of Lethbridge
Soils Subgroup





Legend

- Water
- City Boundary

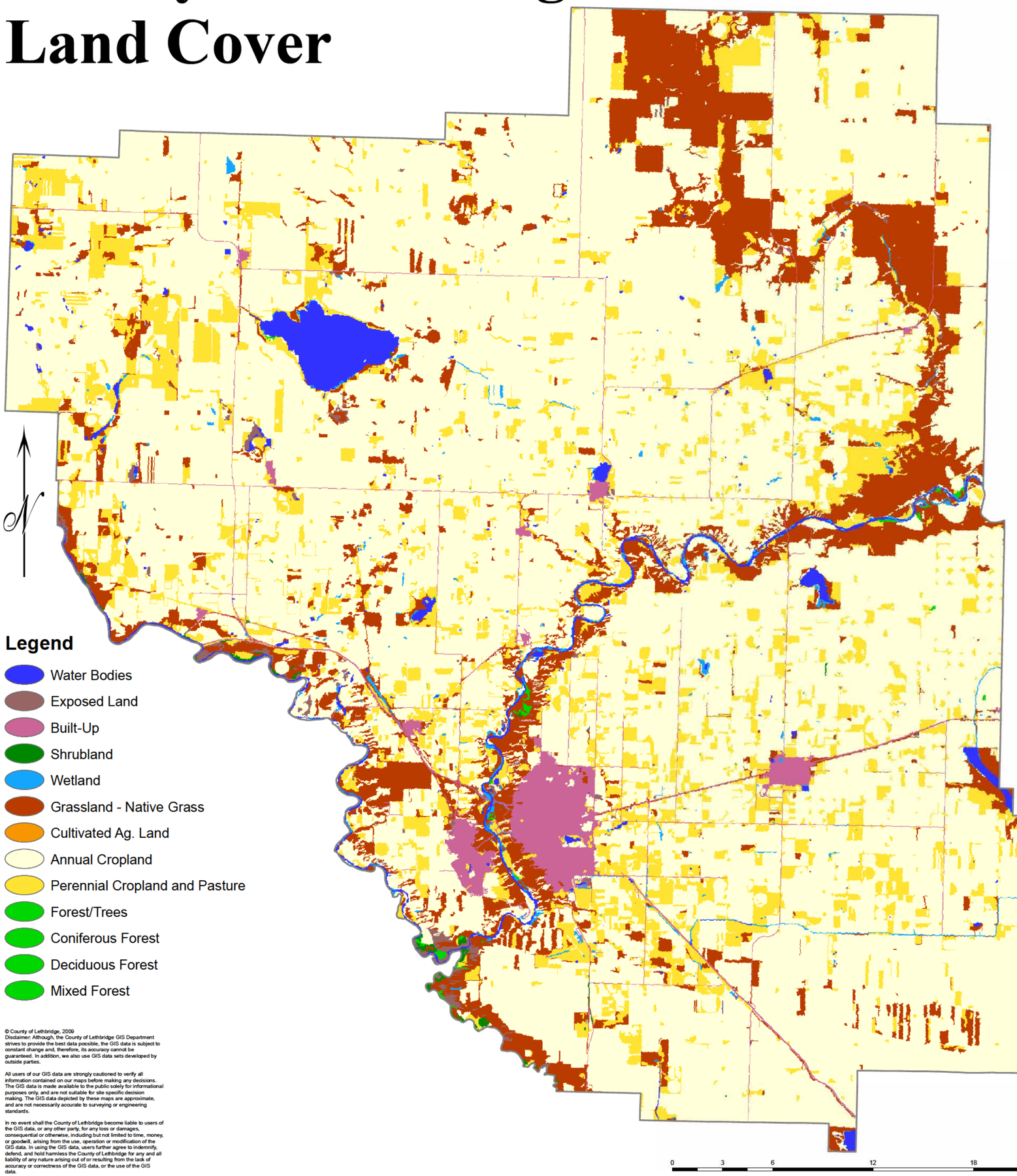
Soil Sub Group

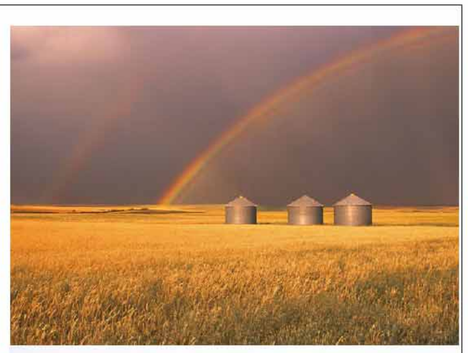
- Unknown
- Calcareous Dark Brown Chernozemic
- Dark Brown Solodized Solonetz
- Dark Brown Solonetz
- Orthic Brown Chernozemic
- Orthic Dark Brown Chernozemic
- Orthic Humic Gleysol
- Orthic Regosol
- Rego Brown Chernozemic
- Rego Dark Brown Chernozemic
- Rego Gleysol
- Solonetzic Dark Brown Chernozemic

0 3 6 12 18 24 Kilometers

COUNTY OF LETHBRIDGE

County of Lethbridge
Land Cover





Legend

- Water Bodies
- Exposed Land
- Built-Up
- Shrubland
- Wetland
- Grassland - Native Grass
- Cultivated Ag. Land
- Annual Cropland
- Perennial Cropland and Pasture
- Forest/Trees
- Coniferous Forest
- Deciduous Forest
- Mixed Forest

0 3 6 12 18 24 Kilometers

IDS Integrated Development Strategy

ALVIN REINHARD FRITZ ARCHITECT INC

David Amos & Associates

DAW D.A. Watt Consulting

PLACEMAKERS

Westhoff Engineering Resources, Inc.