

***TRI AREA IDP
BACKGROUND
INFORMATION***

Introduction

This background report and background mapping has been prepared under a separate cover from the Tri Area IDP . This background information was assembled in 2007 and was taken from existing available sources at that time.

1) IDP BACKGROUND INFORMATION

The Intermunicipal Development Plan area comprises the land as shown in the maps in Section. Excluding Medicine Hat and Redcliff, this constitutes approximately 20,406 hectares (50,422 ac) or nearly 79 square miles. The following section describes the existing conditions. Please refer to the end of Appendix D for background mapping of existing conditions, being current at the time of approval of this Plan.

2) EXISTING PHYSICAL SITE CHARACTERISTICS

a) Topography and Drainage (Appendix D map 2, 3, 4, 5)

The IDP area the City of Medicine Hat and the Town of Redcliff are located in a bowl shaped basin. The land varies in elevation from a high of 770 m at the east, west and south periphery of the Plan area down to a low of 650m at the South Saskatchewan River, for a total relief of approximately 120m (394ft).

A few higher elevation spots provide pleasant distant views of the region. These high spots include land south and east of the City, south Dunmore and in the coulee system located west of the City on the south side of the South Saskatchewan River.

The land is further incised with creeks and irrigation canals. Three major creek watersheds drain through the City in to the River; Seven Persons Creek, Bullshead Creek and Ross Creek. While the lands in the coulees below the

valley breaks offer the greatest topographical slope and constraints to development, they are typically attractive from a rural residential perspective.

b) Agricultural Soils (Appendix D map 6)

The Canada Land Inventory for Agriculture identifies the Plan area as largely CLI class 2 and 3. This CLI rating has been superseded with more detailed soils mapping. However, the intent of this mapping is to provide a general overview of agricultural capability. The CLI indicates good cropland throughout except in pockets of areas subject to poor drainage. Much of the high agricultural rating is due to the presence of irrigation water on the south and west side of the Plan area. Irrigation water is supplied through the St. Mary's River Irrigation District (SMRID). Over time, additional irrigation upgrading has provided more efficient transmission of water through pipelines and replacing open canals.

c) Groundwater Quantity

A 2001 Regional Groundwater study for Cypress County, was prepared and funded by Agriculture and Agri-Food Canada and prepared by Hydrogeological Consultants Ltd. This section contains excerpts of that report for the IDP area in general and the Dunmore area specifically. The study identified several geological features that had an effect on the groundwater characteristics of the IDP area. One feature is the buried Medicine Hat Bedrock Valley which runs generally southwest to northeast through the IDP area and the City itself. The Valley is less than nine kilometres wide within the County, with local bedrock relief being up to 60 metres. Sand and gravel deposits can be expected in association with this bedrock low, with the thickness of the sand and gravel deposits being mainly less than ten metres.

In the Dunmore area, the presence of sand and gravel occurring within one metre of the land surface can be expected in the eastern and southwestern parts of township 012, range 05, W4M. The thickness of the first sand and gravel is mainly less than five metres. In township 012, range 05, W4M, the Lower Sand

and Gravel Aquifer is the main Aquifer in surficial deposits present. Apparent yields of more than 100 m³/day in the southwestern part of township 012, range 05, W4M are not uncommon (see page A-29). In township 012, range 04, W4M, the Upper Sand and Gravel Aquifer is the main Aquifer in surficial deposits present, with apparent yields mainly in the range from 10 to 100 m³/day. The apparent yield for individual water wells completed in SW 04-012-05 W4M through the Lower Sand and Gravel Aquifer is estimated to be 167 m³/day. The Lower Sand and Gravel Aquifer is the primary Aquifer in the surficial deposits that underlie the Bullshead area of township 011, ranges 05 and 06, W4M. There are 67 water wells with apparent yield data that are completed in the Lower Sand and Gravel Aquifer in the Bullshead area. The average apparent yield from these 67 water wells is 75 m³/day. The yields that are greater than 100 m³/day are mainly in water wells that are located in the Buried Medicine Hat Valley in township 011, range 06, W4M or in the meltwater channel in township 011, range 05, W4M.

The Highway 3 Corridor, underlain by the Buried Medicine Hat Valley, is the area where there are the largest number of water wells completed in the lower surficial deposits (Figure 13, page 18). There are more than 90 water wells with apparent yield data that are completed in the Lower Sand and Gravel Aquifer in this Area. The average apparent yield from these 90 water wells is 110 m³/day, with 86% having an apparent yield of less than 200 m³/day. There are eight records that indicate dry, or abandoned with “insufficient water”. There is only one licensed groundwater user in the Highway 3 Corridor. This groundwater user in 04-05-012-06 W4M is licensed to divert 40 m³/day for stock purposes. Within the Medicine Hat city limits, there are 13 groundwater users licensed to divert a total of 13,400 m³/day, or an average of 1,030 m³/day per user.

The following table shows typical groundwater consumption requirements for selected land uses.

Estimated Groundwater Consumption

Groundwater Purpose ⁽¹⁾	Lower Limit (m ³ /day)	Upper Limit (m ³ /day)
Residential	1.1	3.4
Multi Parcel	1.1	3.4
Commercial	1	Max. available
Light Industrial	1	Max. available
Agricultural ⁽²⁾	17.1	Max. available

⁽¹⁾ per household

⁽²⁾ traditional agriculture use as defined in the Water Act

d) Groundwater Quality

The chemical analysis results of groundwaters from the sand and gravel aquifers in the surficial deposits indicate the groundwaters are generally chemically hard and high in dissolved iron. In Cypress County, groundwaters from the surficial aquifers mainly have a chemical hardness of greater than 200 mg/L. Nearly 90% of the groundwaters from the surficial deposits have a TDS concentration of more than 500 mg/L. Groundwater from water wells completed in SW 04-012-05 W4M in the aquifers in the surficial deposits are expected to have TDS concentrations of approximately 1,815 mg/L. Groundwater from water wells completed in 04-01-011-07 W4M in the aquifers in the surficial deposits are expected to have TDS concentrations of approximately 1,534 mg/L.

A 1998 Groundwater study for the Hamlet of Dunmore by Bel-MK Engineering summarized that Dunmore is dominated by sand from surface to approximately 20 m depth. Below this sand is approximately 25 m of clay. Water bearing glacial deposits of variable thickness are present both above and below the clay. The Oldman formation sandstone is typically encountered at 50-60m. The permeable nature of the surficial sands above the clay are susceptible to contaminants, but less so below the clay. Because nearly all residences and businesses in Dunmore are serviced by a piped water system, potential impacts

of groundwater contamination are low. Since the percolation rates for on-site sewage systems are unsuitable for standard tile fields, the sewage disposal options for future development in Dunmore are a) approved treatment mounds, b) tile fields with clay liners or c) tie into a municipal sewage collection and treatment system.

e) Environmentally Significant areas (Appendix D map 7)

The majority of Environmentally Significant Areas (ESA's) are related to creek environments. These ESA's have been assessed in 1991 by Sweetgrass Consultants and revised by Alberta Community Development in 1997. The original mapped extent of the ESA's is available for review at <http://www.cd.gov.ab.ca/preserving/parks/ahic/esa.asp>.

Ross Creek Area – This area is in a dry mixedgrass and mixedgrass eco region. It is National in significance and is home to the largest herds of wintering Pronghorn in Canada. The area is composed of extensive badlands, riparian habitats, ephemeral wetlands and grasslands. It is also populated with mule deer, white-tailed deer and pronghorn habitat. There is also a diversity of breeding birds including a great blue heron colony. It is a former Sage Grouse nesting area and a current leopard frog breeding habitat. It is however a discontinuous unit with major disturbances including the Trans-Canada Highway and extensive cultivation of sagebrush flats.

South Saskatchewan River-Medicine Hat North - This area is in a dry mixedgrass eco region. It is National in significance and part of the most intact and wild river reaches in the Grasslands of Canada. It is also the largest and highest density of hibernacula (overwintering areas) for large snakes in Alberta, possibly in Canada. This is a scenic valley of the South Saskatchewan River containing eroding cutbanks, springs, massive slump blocks and badlands, diverse coulee shrubbery. It is also a nesting area for rare or vulnerable birds of prey including Prairie Falcons, Ferruginous Hawks, Cooper's Hawks and Golden Eagles. It is a

feeding area for American White Pelicans plus a mule deer and pronghorn habitat. It contains important fossils of Pleistocene vertebrates.

South Saskatchewan River-Medicine Hat West - This area is in a dry mixedgrass eco region. It is Provincial in significance and one of the most productive bird of prey nesting areas in Alberta as well as a major snake hibernacula. The terrain characterizes the rugged badlands that are localized in Alberta. This is a scenic valley of the South Saskatchewan River containing eroding cutbanks, springs, massive slump blocks and badlands, diverse coulee shrubbery. It is a nesting area for rare birds of prey including Prairie Falcons, Ferruginous Hawks and Golden Eagles as well as a feeding area for American White Pelicans. It contains Short-horned Lizard habitat along valley rims among some native mixed grassland on adjacent uplands. It is a key mule deer and pronghorn habitat, major snake hibernacula (overwintering areas). The deep river pools are important to Lake Sturgeon. It is a locally important breeding area for Canada Geese.

3) EXISTING HUMAN FEATURES

a) Existing Roads (Appendix D map 8)

The road system in the Plan area is connected with 8 major paved roads. The remainder are a combination of oiled and gravelled to serve local residents. Highways # 3, 523 and 524 serve the west side of the Plan area. Highway 41 and 41A serve the east side of the Plan area. Township Road 120 is considered by the County as a prime east-west arterial connecting Highway 41 and Highway 3 as well as connecting the Eagle Butte Road to the south of the County.

b) Existing Municipal Services (Appendix D map 9)

Water Treatment - The Plan area has developed a web of potable water supply. Four water co-ops have been established in the County near Medicine Hat. Two Co-ops are serviced by the City and two co-ops are serviced by the County.

The County also supplies the hamlet of Seven Persons with a potable waterline from the City system. The waterline is sized to service a population of 900 persons. However, the County is considering dedicating the additional capacity beyond the hamlets current population to rural users along the waterline. The Hamlet of Dunmore, Veinerville subdivision and Desert Blume development are serviced with City water through established supply gates to the County.

A provincial water licence for direct withdrawal of water from the South Saskatchewan River issued for Paramata Estates (located west of Redcliff). This includes a privately operated water treatment facility. Other water supply includes three public and one private bulk water distribution points throughout the Plan area.

The Town of Redcliff supplies its own potable water supply as does the City of Medicine Hat. The City's current treatment capacity for a population of approximately of 75,600. The Town's water treatment plant is nearing capacity. The Province recognizes water is a limited resource. The South Saskatchewan River basin (SSRB) has been closed to new licences since 2005. Partly due to this limitation, the population capacity for the existing municipal water licences is currently under review by the Province for both municipalities and the other fifteen major cities in the (SSRB). The outcome of this review may influence future urban and agricultural land use patterns in the region.

The St. Mary's River Irrigation District (SMRID) supplies the south and west portion of the Plan area with raw water for irrigation. They supply water to 1,700 irrigators who farm 372,000 acres. Its network of pipelines and canals provides a substantial opportunity for value-added agricultural produce.

Wastewater Servicing - The City of Medicine Hat receives and treats wastewater from Redcliff, Desert Blume and the hamlet of Veinerville. The City waste water treatment plant capacity is under review to confirm a potential remaining

capacity of roughly 10-15 years City population growth before expansion is required.

Solid Waste Management – The County and Redcliff operate a regional landfill west of Redcliff that currently has capacity for another 200 years given the future population projections of the Town and the County. The City also operates a landfill east of the City. Its capacity is estimated at 20-25 years under established growth projections.

c) Existing Oil and Gas facilities / pipelines (Appendix D map 10)

The map illustrates the heavy network of oil and gas pipelines as well as the current and historical wells operating in the area. Since the Provincial Oil and Gas Act places approval and regulation under Provincial control, municipalities have little control over the placement and remediation of wells, pipelines and batteries.

d) Land ownership patterns (Appendix D map 11)

The Plan area encompasses approximately 19,773 hectares (48,838 ac). This does not include the City or the Town lands. Within this area there are a number of large land holdings on the east and northwest portions of the Plan area. Most of the land in the IDP has been left in a relatively unsubdivided state. The exception is the land between Medicine Hat and Twp Rd 120. This has been subject to a substantial fragmentation for country residential subdivision, some high density residential and 40 acre parcels. A second, smaller cluster of country residential occurs along the right bank of the South Saskatchewan River, just west of Redcliff.

e) Existing Land Use Bylaw Districts (Appendix D map 12, 13)

The County Land Use Bylaw district map is shown on Map 12 and a more generalized version of the same information on Map 13. The maps clearly show

the country residential pattern along creeks, coulees, riverine features and close in to the City of Medicine Hat. A node of industrial uses is also establishing itself at Highway 1 and Highway 524. Other than that, the majority of the area is Agricultural District (A-1) (Urban Fringe). The intent of this District is the control urban, non agricultural land uses in the immediate vicinity of urban centres.

An Airport Vicinity Protection District (AVPA) establishes height restrictions, noise exposure forecasts (NEF) and electronic interference in the area around the airport for safety of property and aircraft using the runways. While the relative risk associated with land uses in the vicinity of airports is a matter of some concern, the volume of flights does not justify undertaking a risk assessment for the Airport and surrounding land uses. It is assumed that the height limitations and land use restrictions in the Airport Vicinity Protection Area (AVPA) overlay district of the County and City Land Use Bylaw exercise sufficient diligence at this point.

f) Opportunities and Constraints (Appendix D map 14)

The capability of land to accept development is tied to existing biophysical constraints and existing human land uses. Map14 overlays many of the map elements identified in the above discussion. This Map identifies potential opportunities and constraints that will influence affect future land use plans. The map shows where there is opportunity to expand Redcliff boundaries; where there is room for the City to expand within its current boundaries; where sand and gravel resources are located; steeply sloped land; existing feedlots and the future potential expansion of municipal infrastructure.

4) REDCLIFF AND MEDICINE HAT POPULATION AND LAND CONSUMPTION PROJECTIONS 2007 TO 2057

a) Why do this exercise?- This exercise was necessary to identify the land requirements for the urban areas for the next 50 years and beyond. This will have an influence on the need for future annexation by Medicine Hat and Redcliff.

b) Assumptions Required - This projection uses a snapshot in time – that of a strong economy in 2005. As with any projection, some assumptions are required (as explained below). Population rates and residential densities will always fluctuate and land may not develop in the sequence shown on the maps. The following notes explain the methodology.

c) Future Population Projection to 2057 – The 2004 Medicine Hat MDP provided a population projection to 2031. This was then extended to 2057 using an assumed 2% annual population growth compounded annually for the remaining years to 2057. Redcliff’s population was estimated in 2005 at 5,000 persons and a 2% annual population growth was also assumed.

d) What land is undevelopable and what remains developable? - The land area was derived from GIS evaluation of the “per person municipal human footprint”. This was based on the population (projected from 2005) divided by gross developed land area shown on 2005 airphotos. Assumptions were made to adjust for anomalies (such as undevelopable river valleys and coulees designated as municipal open space, the City’s large gypsum pile in the north, etc.).

e) Land area per person calculation (ie. ‘human footprint’) - The residential “per person human footprint” was calculated as hectares/ person in two land use categories; residential and commercial/ industrial (see table below). The

residential category was derived from a sample of more recent, mixed-density, residential neighbourhoods in South Medicine Hat. It is assumed that this will be the expected future residential footprint (calculation includes roads, parks, schools, etc) for both Redcliff and Medicine Hat. The **commercial/ industrial** category identified all zoned, developed land that included storage yards, access and open areas used for parking, and occasional storage.

f) Future developable land inventory – Once the “per person human footprint” was calculated, an inventory of remaining developable land in “greenfield areas” (rural land on the outskirts of the mostly built-up area) was identified using the existing 2005 airphoto. Areas of steep slopes (15% or greater) and other undevelopable lands were excluded for the most part. The areas for remaining developable were matched to the type of land use in the Growth Strategies. In the case of Redcliff, some County land would be needed for future annexation by 2057.

g) Footprint calculation for 2057 – By multiplying the per person area footprint by the population projection increase, we will see how much urban land may be developed by 2057. The map entitled “Future Development Footprint (Projected to 2057)” shows that most, but not all Medicine Hat would be developed by this time. Redcliff would also need to annex more land.

h) Mapping attached - Three maps are included in the exercise to assist the reader. Maps include;

- an existing urban growth strategy policy map. This identifies what lands are considered by the municipalities to eventually be used more intensively;
- a map showing land (as of 2005 aerial photography) that is developable, undevelopable or already developed and
- a future development footprint map projected to 2057. This map identifies what is projected to be consumed if land development proceeded

according to the calculations. The areas remaining undeveloped in this map are shown for convenience and may be developed in a different sequence than shown.

The municipal footprint map has been included to conceptually illustrate how much land could be consumed for residential and commercial/ industrial uses in Medicine Hat and Redcliff if current trends hold.

Future Land Development Capacity 2005 to 2057

	MEDICINE HAT	REDCLIFF	TOTAL
2005 pop. (estimated)	56,048	5,000 (est.)	61,048
additional projected population by 2057	71,122*	9,002**	80,124
total projected population by 2057	127,170*	14,002**	141,172
gross remaining residential developable	2562.52 hectares	641.57 hectares (within IDP boundaries)	3204.09 hectares
gross remaining commercial/industrial developable	1704.27 hectares	1243.65 hectares (within IDP boundaries)	2947.92 hectares

*2% population growth rate applied from 2031 –2057. Growth rate from 2005-2031 based on MDP Draft final report by Urban Futures Aug. 31, 2004)

** 2% population growth rate applied from 2005 –2057.

Per Person Municipal Human Footprint – Redcliff and Medicine Hat

Land Use category	Redcliff footprint as hectares/person (ac/person)	Medicine Hat footprint as hectares/person (ac/person)
Residential	0.034 (0.084ac)	0.034 (0.084ac)
Commercial/ Industrial	0.036 (0.089ac)	0.018 (0.044ac)

MEDICINE HAT FUTURE FOOTPRINT SUMMARY

Growth Capacity 2005 to 2057 and to full buildout within City Boundaries

ASSUMED DEVELOPMENT SEQUENCE PRIORITY *	LAND USE CATEGORY	REMAINING GROSS DEVELOPABLE AREA	
		HECTARES	ACRES
	<u>RESIDENTIAL SECTORS</u>		
A	Saamis Heights Res.	35.13	86.82
A	South Vista Heights Res.	24.08	59.5
A	Southlands Res.	180.66	446.41
A	The Hamptons (Southridge) Res.	37.28	92.12
A	Ranchlands Res.	149.52	369.48
A	South Res.	232.70	575.01
B	Burnside Estates Res.	175.69	434.12
B	Burnside Heights Res.	219.86	543.28
C	Southwest Res.	177.01	437.40
C	Holsom Road/ Echodale Res.	784.51	1938.51
C	North Res.	223.44	552.13
C (buildout to 2057 here)	Northeast Res. - (55% (178.11ha) consumed by 2057)	322.64	797.24
	sub-total	2562.52	6332.02
	<u>COMMERCIAL/ INDUSTRIAL SECTORS</u>		
A	Southlands Comm.	28.88	71.35
A	Box Springs Comm./ Ind.	216.07	533.91
A	23 rd Street Comm./ Ind.	89.49	221.14
A	North Central Ind.	251.80	622.21
A	West Gershaw Comm./ Ind.	36.08	89.15
A	HWY1 Comm. (3 nodes)	30.09	74.34
A	North Gershaw Comm.	34.25	84.63
B (buildout to 2057 here)	North Ind. - 60% (593.34ha) consumed by 2057	987.66	2,440.52
B	Westco Ind. shown as not consumed	29.95	74.00
	sub-total	1704.27	4211.25
	TOTAL OF RESIDENTIAL AND COMMERCIAL/ INDUSTRIAL	4288.79 ha	10,543.27 ac

* The sequence of priority is for convenience purposes. Land may not actually develop in the order shown.

REDCLIFF FUTURE FOOTPRINT SUMMARY
Growth capacity 2005 to 2057 and to full buildout within IDP boundaries

ASSUMED DEVELOPMENT SEQUENCE PRIORITY	LAND USE CATEGORY	REMAINING GROSS DEVELOPABLE AREA	
		HECTARES	ACRES
	<u>RESIDENTIAL SECTORS</u>		
A	Southeast Redcliff Res.	153.80	380.05
B	West Redcliff Res.	88.88	219.61
B (buildout to 2057 here)	Northwest Redcliff Res. - 16% (63.32ha) consumed by 2057	398.89	985.65
	sub-total	641.57	1585.31
	<u>COMMERCIAL/ INDUSTRIAL SECTORS</u>		
A (buildout to 2057 here)	North Redcliff comm./ Ind. (3 nodes) - 54% (324ha) consumed by 2057	602.08	1,487.73
	TOTAL OF RESIDENTIAL AND COMMERCIAL/ INDUSTRIAL	1243.65 ha	3073.04 ac