ISL Engineering and Land Services

Inspiring sustainable thinking

City of Lloydminster

Final Report

Comprehensive Growth Strategy

August 2013

ISL Engineering and Land Services

ISL Engineering and Land Services Ltd. is an award-winning full-service consulting firm dedicated to working with all levels of government and the private sector to deliver planning and design solutions for transportation, water, land, and environmental projects.

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Disclaimer

The information presented in this Growth Study is for annexation purposes only and is not intended to alter market conditions. Developers, landowners and prospective landowners are responsible for undertaking their own due diligence.

1.0 Introduction

The *City of Lloydminster Growth Study* comprises one of three components of the *City of Lloydminster Comprehensive Growth Strategy* (CGS) to determine growth directions within and beyond city limits to accommodate Lloydminster's future growth over the next 30 years. The other two components of the CGS include an *Environmental Inventory* and a *Servicing Assessment*. This *Growth Study* has been prepared by ISL Engineering and Land Services (ISL) and Nichols Applied Management. The associated *Environmental Inventory* has been prepared by Spencer Environmental Management Services with support from ISL while the *Servicing Assessment* has been prepared by ISL.

The findings of *Growth Study*, *Environmental Inventory* and *Servicing Assessment* will inform possible expansion of the City's boundaries to secure a 30-year land supply to accommodate future development that meets Lloydminster's medium-term growth requirements. The overall intentions of this *Growth Study* are to:

- determine the development capacity of the City's existing land supply;
- forecast population, employment and housing unit requirements over the next 30 years;
- provide a reasoned estimate of future land requirements for residential, commercial and industrial purposes; and
- establish recommended growth directions that sufficiently address the City's future medium-term growth needs.

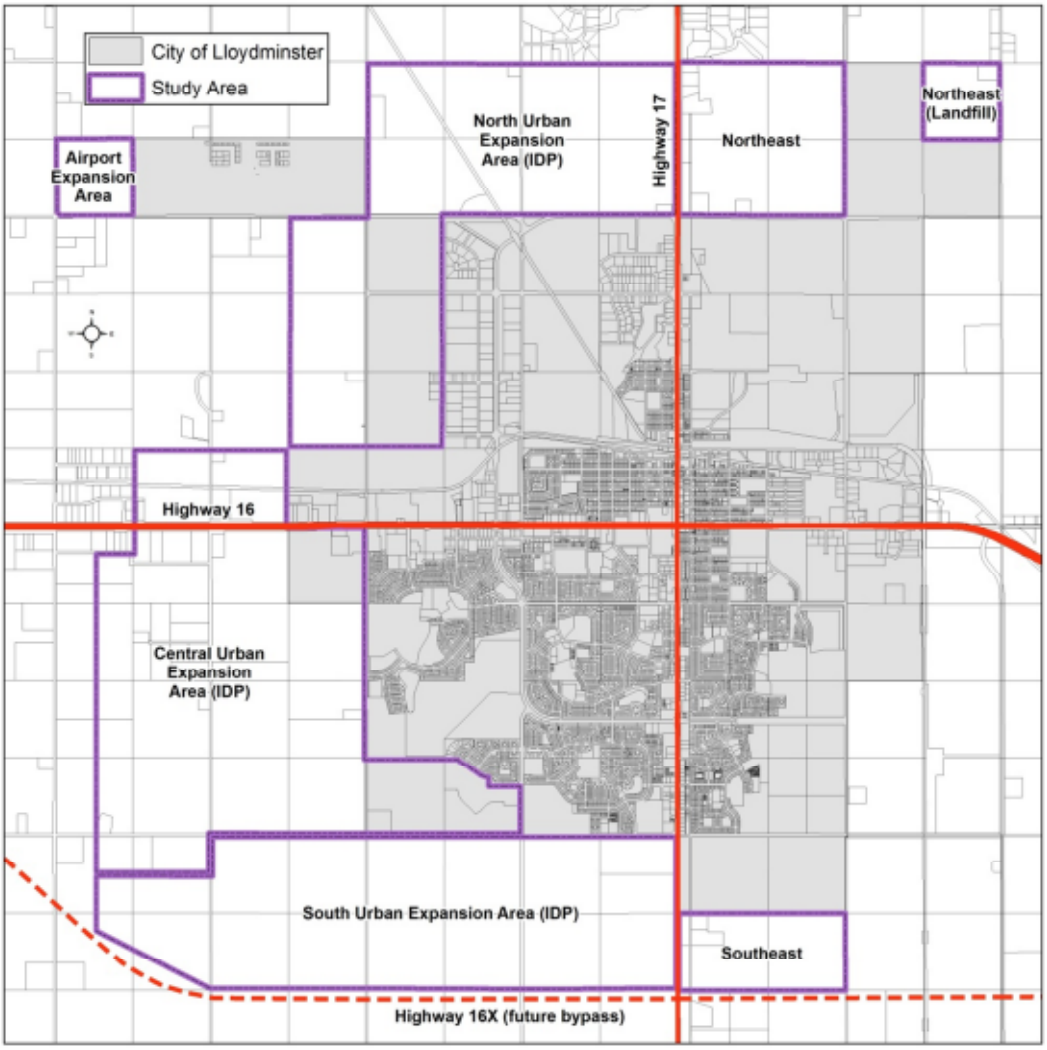
1.1 Study Area

The study area for the *Growth Study* component of the CGS comprises over 48 quarter sections including the following seven sub-areas that are identified in Map 1:

- Three urban expansion areas (north, central and south) within the County of Vermilion River in Alberta identified in the City's intermunicipal development plan (IDP) with the County;
- A single quarter section within the County of Vermilion River to the west of Lloydminster's municipal airport;
- Four quarter sections within the Rural Municipality (RM) of Britannia No. 502 to the north of Lloydminster between Highway 17 to the west and the City's landfill to the east;
- A single quarter section to the northeast of the City's landfill within the RM of Britannia No. 502; and
- Two quarter sections within the RM of Wilton No. 472 to the south of Lloydminster, west of Highway 17 and north of the future Highway 16 bypass.

Further to the study area, those remaining undeveloped lands within Lloydminster's current city limits are also subject to the *Growth Study*. Portions of the north and central urban expansion areas from the IDP overlap into the City and cover some of its remaining undeveloped lands.

Map 1: Study Area



2.0 Population and Demographics

2.1 Historic Population Growth

Table 1 illustrates the City of Lloydminster's historic population growth since 1906 according to federal census results, while Table 2 illustrates historic population growth since 2005 according to municipal census results. Overall and average annual growth rates between federal censuses (every five years) and municipal censuses (varies from two to four years) are provided. The overall and average annual absolute growth is also provided and growth levels are assigned based on the average annual growth rates observed.

Table 1: Historical Population Growth, 1906-2011 Federal Censuses

Year	Population	Overall Growth Rate	Average Annual Growth Rate [1]	Absolute Growth	Average Annual Absolute Growth	Growth Level [2]
1906	519					
1911	663	27.7%	5.0%	144	29	high
1916	788	18.9%	3.5%	125	25	high
1921	755	-4.2%	-0.9%	-33	-7	low
1926	1247	65.2%	10.6%	492	98	high
1931	1516	21.6%	4.0%	269	54	high
1936	1420	-6.3%	-1.3%	-96	-19	low
1941	1,624	14.4%	2.7%	204	41	high
1946	1,833	12.9%	2.5%	209	42	moderate
1951	3,938	114.8%	16.5%	2,105	421	high
1956	5,077	28.9%	5.2%	1,139	228	high
1961	5,667	11.6%	2.2%	590	118	moderate
1966	7,071	24.8%	4.5%	1,404	281	high
1971	8,691	22.9%	4.2%	1,620	324	high
1976	10,311	18.6%	3.5%	1,620	324	high
1981	15,031	45.8%	7.8%	4,720	944	high
1986	17,356	15.5%	2.9%	2,325	465	high
1991	17,283	-0.4%	-0.1%	-73	-15	low
1996	18,953	9.7%	1.9%	1,670	334	moderate
2001	20,988	10.7%	2.1%	2,035	407	moderate
2006	24,028	14.5%	2.7%	3,040	608	high
2011	27,804	15.7%	3.0%	3,776	755	high

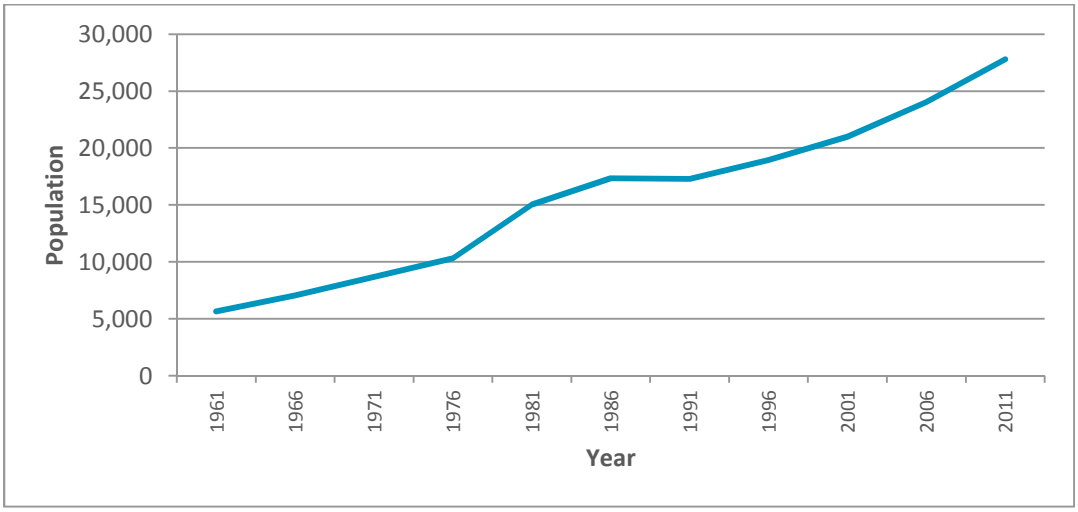
[1] Compounded average annual growth rates.
[2] For the purpose of this analysis, a "low" growth level is an average annual growth rate of less than 1.0% and a "high" growth level is an average annual growth rate of greater than 2.5%. A "moderate" growth level is an average annual growth rate of between 1.0% and 2.5% inclusive.

Table 2: Historical Population Growth, 2005-2013 Municipal Censuses

Year	Population	Overall Growth Rate	Average Annual Growth Rate [1]	Absolute Growth	Average Annual Absolute Growth	Growth Level [2]
2005	23,643					
2007	25,523	8.0%	3.9%	1,880	940	High
2009	26,502	3.8%	1.9%	979	490	Moderate
2013	31,483	18.8%	4.4%	4,981	1,245	High

Figure 1 illustrates the historic population growth of the City of Lloydminster since 1961 presented in Table 1.

Figure 1: Historical Population Growth, 1961-2011 Federal Censuses



Key observations from Tables 1 and 2

- The City of Lloydminster has grown from a population of 519 in 1906 to 27,804 in 2011.
- At its 2011 population of 27,804, the City has more than tripled its population over the past 40 years since recording a population of 8,691 in 1971, and more recently has grown by nearly 50% over the past 15 years since recording a population of 18,953 in 1996.
- Among the various federal census intervals between 1961 and 2011, the City's average annual growth rate has been less than 1.9% only once between 1986 and 1991 (-0.1%).
- With the exception of a five-year period between 1986 and 1991, the City of Lloydminster has experienced moderate to high population growth over the past 50 years since 1961.
- The City's average annual growth rate has steadily climbed from 1.9% to 3.0% over the past four federal censuses since 1991.

In addition to these observations, the Lloydminster census agglomeration[3] experienced the tenth-highest population growth between 2006 and 2011[4] among Canada's 114 census agglomerations according to the 2011 federal census. Its five-year growth rate over this period was 14.0%.[4]

Table 3 illustrates the City's growth rates over various intervals from 2011, ranging from the past 5 years to the past 50 years.

Table 3: Average Population Growth, Selected Timeframes to 2011

Timeframe Ending in 2011	Overall Growth Rate	Average Annual Growth Rate [5]	Absolute Growth	Average Annual Absolute Growth
Last 50 years	390.6%	3.2%	22,137	443
Last 45 years	293.2%	3.1%	20,733	461
Last 40 years	219.9%	2.9%	19,113	478
Last 35 years	169.7%	2.9%	17,493	500
Last 30 years	85.0%	1.8%	12,773	426
Last 25 years	60.2%	1.9%	10,448	418
Last 20 years	60.9%	2.4%	10,521	526
Last 15 years	46.7%	2.6%	8,851	590
Last 10 years	32.5%	2.9%	6,816	682
Last 5 years	15.7%	3.0%	3,776	755

Key observations from Table 3

- Over the 50-year interval (1961-2011), the City's population has increased an average of 3.2% annually.
- Between the last two federal censuses (2006-2011), the population has increased an average of 3.0% annually.
- The lowest average annual growth rate among the various intervals was 1.8% over the 30-year interval (1981-2011).

Lloydminster's sustained moderate-to-high historical population growth pattern is reflective of several factors, including the following:

- the City's significant role in the oil and gas industry;
- its role as a regional service centre for eastern Alberta and western Saskatchewan;
- its nearly equidistant location along the Yellowhead Highway between Edmonton and Saskatoon; and
- its quality of life and smaller city atmosphere that makes it attractive to families.

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[3] A census agglomeration (CA), as defined by Statistics Canada, is an "area consisting of one or more neighbouring municipalities situated around a core." To become a CA, it "must have a core population of at least 10,000", and it may be promoted to census metropolitan area (CMA) when it has "a total population of at least 100,000 of which 50,000 or more live in the core." The Lloydminster CA includes the adjacent RM of Wilton No. 472 to the southeast within Saskatchewan as well as the villages of Lashburn and Marshall.

[4] "*The Canadian Population in 2011: Population Counts and Growth*". Population and dwelling counts, 2011 Census. Table 3: Census agglomerations with the highest population growth between 2006 and 2011. Ottawa: Statistics Canada. February 2012. p. 16. Catalogue no. 98-310-X2011001. ISBN 978-1-100-19962-7.

[5] Compounded average annual growth rates.

2.2 Comparator Municipalities

Table 4 compares historic population growth rates over selected timeframes with other municipalities in Alberta and Saskatchewan that are larger with similar economies and also serve as regional service centres (Grande Prairie, Medicine Hat, Prince Albert and Red Deer).

Table 4: Population Growth Rate Comparisons

Comparable Municipality or Province	Federal Census Populations					Average Annual Growth Rates over Selected Timeframes to 2011 [5]			
	1961	1981	2001	2006	2011	Last 50 Years	Last 30 Years	Last 10 Years	Last 5 Years
Grande Prairie	8,352	24,263	36,983	47,076	55,032	3.8%	2.8%	4.1%	3.2%
Lloydminster	5,667	15,031	20,988	24,028	27,804	3.2%	2.1%	2.9%	3.0%
Medicine Hat	24,484	40,380	51,249	56,997	60,005	1.8%	1.3%	1.6%	1.0%
Prince Albert	24,168	31,380	34,291	34,138	35,129	0.8%	0.4%	0.2%	0.6%
Red Deer	19,612	46,393	67,707	82,772	90,564	3.1%	2.3%	3.0%	1.8%
Alberta	1,331,944	2,237,724	2,974,807	3,290,350	3,645,257	2.0%	1.6%	2.1%	2.1%
Saskatchewan	925,181	968,313	978,933	968,157	1,033,381	0.2%	0.2%	0.5%	1.3%

Key observations from Table 4

- Lloydminster's historic growth rates are most similar to those of Grande Prairie among the comparator municipalities.
- Of the two provinces, Lloydminster's historic growth rates are closer to those of Alberta.

2.3 Demographics

Table 5 compares various demographic characteristics of the City of Lloydminster with the same municipalities in Alberta and Saskatchewan compared in Table 4 above that are larger with similar economies and also serve as regional service centres. The demographic characteristics of Alberta and Saskatchewan are also compared.

Table 5: Demographic Characteristics Comparisons

Demographic Characteristic [6]	Grande Prairie	Lloydminster	Medicine Hat	Prince Albert	Red Deer	Alberta	Saskatchewan
Median Age of Population	30.3	32.2	39.8	34.7	34.7	36.5	38.2
Average Children per Census Family	1.1	1.2	0.9	1.2	1.0	1.1	1.1
Average Persons in Private Households	2.6	2.6	2.3	2.5	2.4	2.6	2.5
Percent Low Density Residential Dwellings	73%	73%	73%	69%	66%	72%	79%
Total Occupied Private Dwellings	21,180	10,610	25,445	13,635	36,350	1,390,275	409,645
Low Density Residential Dwellings [7]	15,555	7,700	18,455	9,415	23,825	1,001,700	324,000
Other Residential Dwellings [8]	5,625	2,920	6,995	4,230	12,525	388,575	85,645
Median Income in 2005, All Census Families ($)	83,832	80,183	66,625	53,083	72,609	73,823	58,563

Key observations from Table 5

- Lloydminster has the second lowest median age of the population (behind Grande Prairie).
- Lloydminster has the highest average children per census family (tied with Prince Albert).
- Lloydminster has the highest average persons in private households (tied with Grande Prairie).
- Lloydminster has the highest percentage of low density residential dwellings (tied with Grande Prairie and Medicine Hat).
- Lloydminster has the second highest median income in 2005 of all census families (behind Grande Prairie).

These observations confirm that the City of Lloydminster is a community that is attractive to young families with high income.

Figure 2 presents the age and gender of Lloydminster's population in five-year cohorts from the 2011 federal census. Figures 3 and 4 present the same for the provinces of Alberta and Saskatchewan, pro-rated to Lloydminster's 2011 population of 27,804.

[6] All demographic characteristics are from the 2011 federal census as published by Statistics Canada except for medium income of all census families, which is from the 2006 federal census.
[7] Consists of single detached housing and semi-detached housing as defined by Statistics Canada in the 2011 federal census.
[8] Consists of all other residential housing structure types as defined by Statistics Canada in the 2011 federal census.

Figure 2: Age and Gender by Five-Year Cohorts, Lloydminster

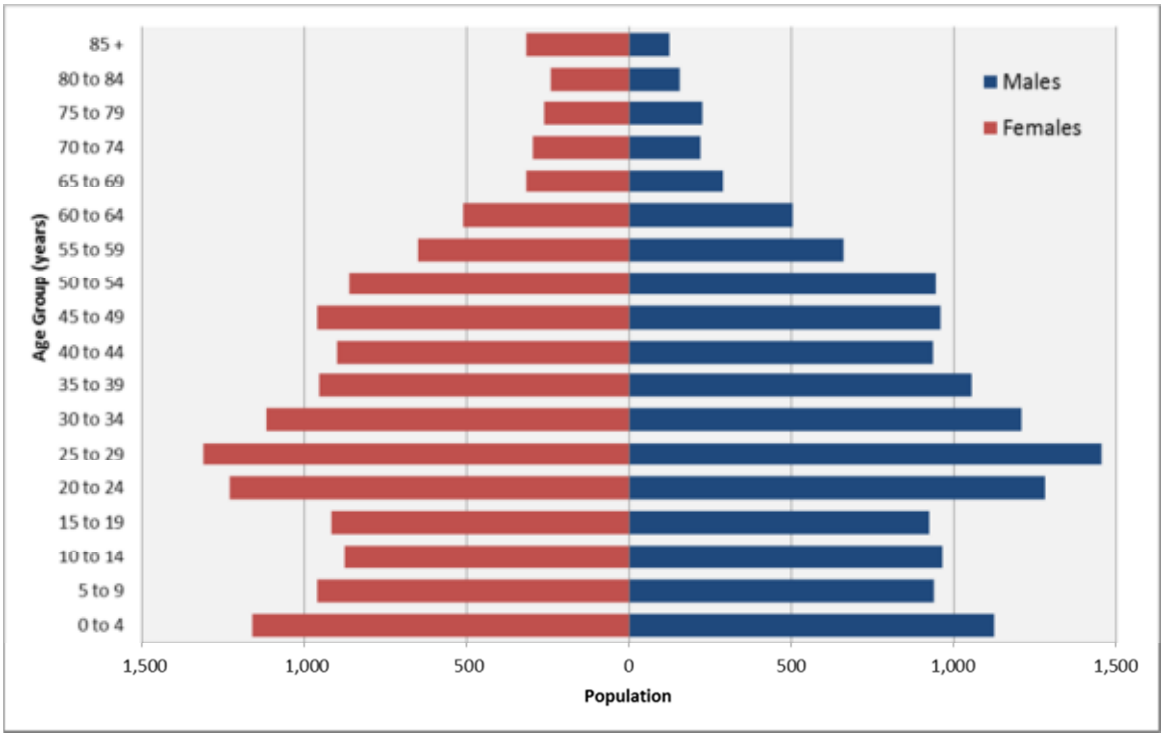


Figure 3: Age and Gender by Five-Year Cohorts, Alberta

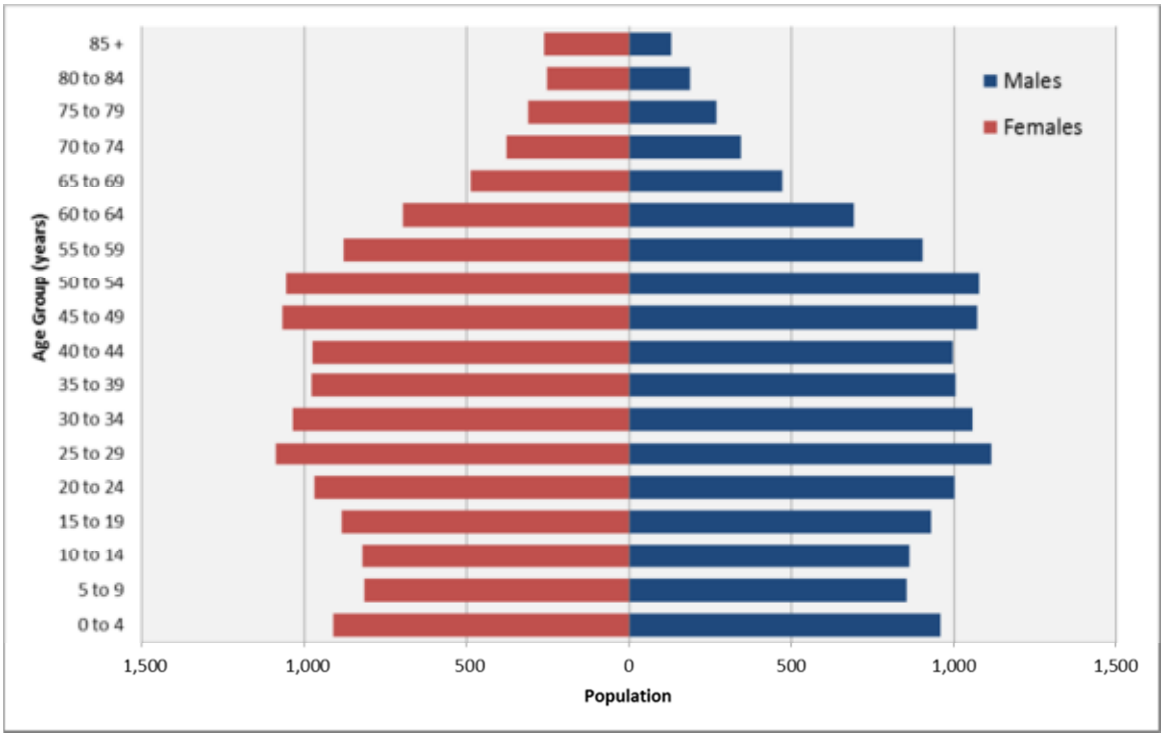
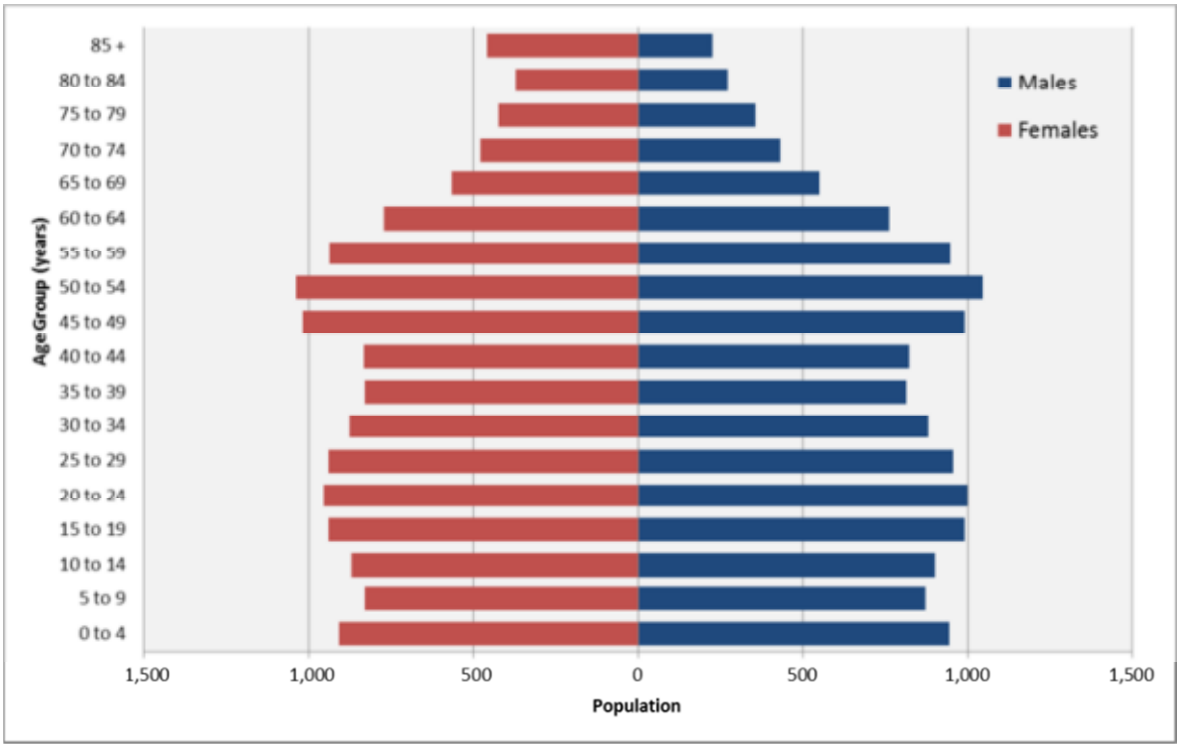


Figure 4: Age and Gender by Five-Year Cohorts, Saskatchewan



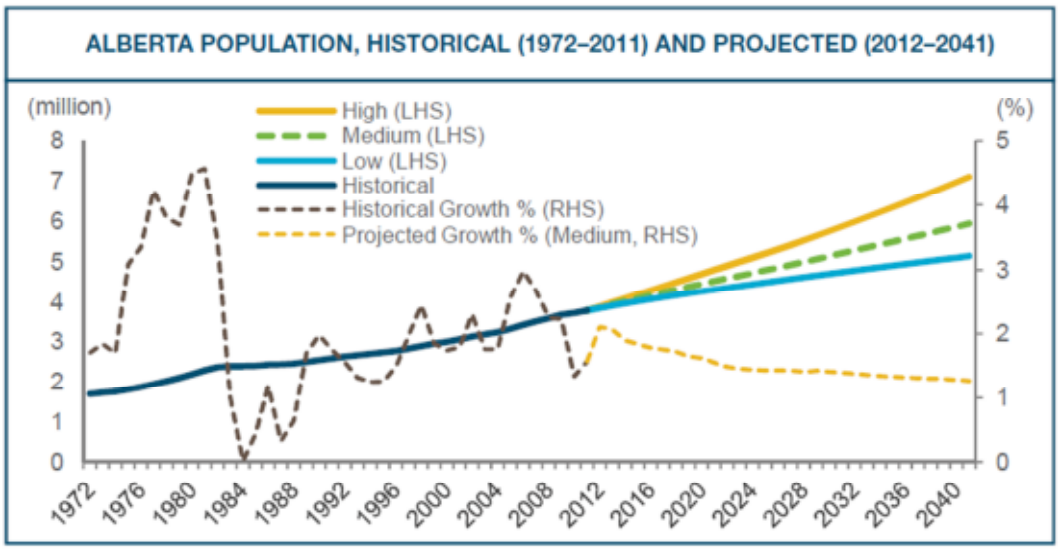
Key observations from Figures 2, 3 and 4

- Lloydminster has two significant population bubbles – the cohorts encompassing ages 20 through 34 and the 0 to 4 age cohort.
- Comparatively, Lloydminster has much greater populations within these bubbles than the two provinces, with Alberta being closer to Lloydminster than Saskatchewan.
- Alberta's two largest population bubbles are ages 45 to 54 (younger baby boomers) and 25 to 34, while Saskatchewan's are ages 45 to 59 (largely within the baby boomer demographic) and ages 15 to 29.
- Lloydminster leads the two provinces in population within ages 0 to 14 and 20 to 39.
- Saskatchewan leads the City and Alberta within ages 15 to 19 and 55 and over.
- Alberta leads the City and Saskatchewan within ages 40 to 54.
- Overall, Alberta's age distribution is more similar to Lloydminster's than Saskatchewan's.

3.0 Future Growth Scenarios

The City of Lloydminster's future growth scenarios are based on the Province of Alberta's population forecasts.[9] The Province of Alberta undertakes annual 30-year population forecasts for each of its 19 census divisions as well as for the province as a whole. Three sets of forecasts are undertaken – low, medium and high growth scenarios – based on three different sets of assumptions. These forecasts along with Alberta's historical population from 1972 to 2011 are shown below in Figure 5.

Figure 5: Province of Alberta Population Growth Forecasts



Sources: Statistics Canada and Alberta Treasury Board and Finance

Alberta's population is expected to continue to grow over the next 30 years. By the end of the forecast period, the Province's population is forecasted to be between five and seven million people (five million under the low growth scenario, six million under the medium growth scenario and seven million under the high growth scenario). Its population in the 2011 federal census was 3,645,257.

3.1 Population Projection Model

The City of Lloydminster's population forecasts rely on a combination of three common population forecasting methods. Those methods are described below.

3.1.1 Comparative Method

The comparative method of population forecasting focuses on the relationship between a local population (e.g., the City of Lloydminster) and the parent population (e.g., the Province of Alberta). Alberta was selected as the parent population as the City's historic population growth and demographics are more closely aligned with Alberta than Saskatchewan.

[9] Lloydminster's future growth scenarios are based on Alberta's forecasts as Lloydminster's historic population growth and economic growth has traditionally been more correlated with Alberta's growth rather than Saskatchewan's growth.

The comparative method features two main comparative methodologies – the ratio and difference methodologies. Forecasts made using the ratio methodology, which is more commonly used, are based on the relationship between the growth of the local and parent populations. The difference methodology, which is used less often, is based on the differential between the growth rates of the two populations. The ratio methodology was used for the City's population forecasts.

The primary advantage of the comparative method is that it can use forecasts for larger areas that are generally based on more sophisticated techniques and are more accurate as a result. The primary disadvantage of the comparative method is that it does not yield information regarding the composition of the population. The comparative method works best when the growth relationship between the local and parent populations is relatively consistent over time. Figure 6 shows the ratio of growth between the City of Lloydminster and the Province of Alberta.

Figure 6: Population Growth Rate Comparison: Lloydminster and Alberta

	Alberta Growth Rate	Lloydminster Growth Rate	Ratio of Lloydminster to Alberta
Last 5 Years	11%	16%	1.46
Last 10 Years	23%	32%	1.44
Last 20 Years	43%	61%	1.41
Last 30 Years	63%	85%	1.35
Last 40 Years	124%	220%	1.77
Last 50 Years	174%	391%	2.25

As observed in Figure 6, the population growth rate for the City of Lloydminster is consistently higher than for the Province of Alberta. This is especially true over the past 30 years when the City's growth rate has been in the order of 40% higher than the Province's growth rate.

3.1.2 Cohort-Survival Method

The cohort-survival method of forecasting disaggregates populations into cohorts – typically five year or, in the case of the City of Lloydminster, single year age segments by gender. Population forecasts are subsequently prepared on the basis of assumptions associated with birth and survival rates. Age specific fertility rates for the City were used in the forecasts.

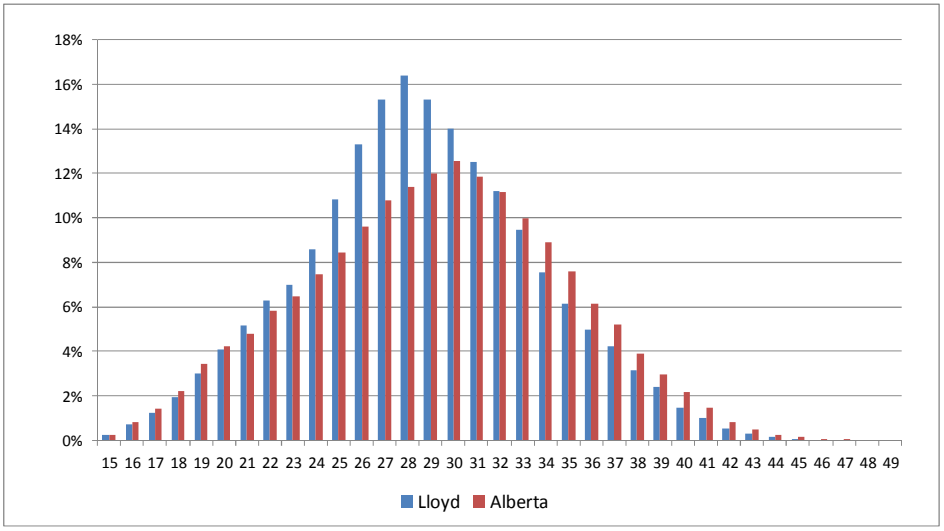
Fertility rates vary quite significantly from community to community. There are a number of potential reasons for these variations. Some of these reasons include income levels, employment opportunities, education levels as well as the number of First Nations in the overall population. Figure 7, compares the City's fertility rates to those for Alberta.

As observed in Figure 7, the City's fertility rates are somewhat higher than for the Province of Alberta. In addition, it is also observed in Figure 7 that women in the City tend to have children earlier than in the Province of Alberta.[10]

[10] Alberta was used as the basis of comparison rather than Saskatchewan primarily because of the higher number of First Nations in Saskatchewan (15%) compared to Alberta (5.4%). By way of comparison, First Nations account for approximately 8% of Lloydminster's population.

The most significant advantage of a cohort-survival forecast is the detail it provides. This detail is valuable in a number of different ways, such as identifying the future demand for alternative types of housing. A model based on cohort-survival techniques focuses on the natural change of the population and, as a result, the migration component of the population forecast must be dealt with separately. As a result, a forecast that utilizes a cohort-survival method must be combined with other approaches.

Figure 7: Age Specific Fertility Rates: Lloydminster and Alberta



With respect to the City's forecasts, both the birth and survival rates were forecasted out over the 30-year forecast period to account for the expectation that birth rates and life expectancies will decrease and increase respectively over time.

3.1.3 Net Migration Method

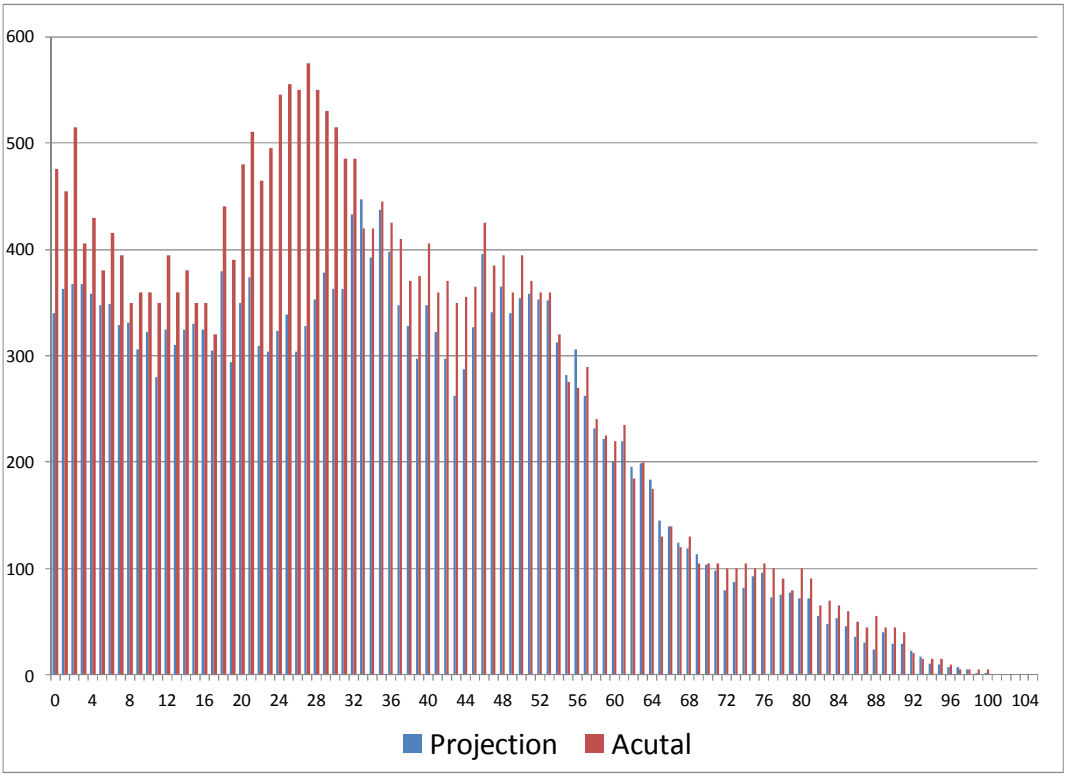
Migration is the most unpredictable component of population change and thus the most difficult to forecast. Past migration flows can be estimated by indirect methods that focus on estimating the natural change in population, as a result ascertaining net migration as a residual.

This type of methodology was used to estimate the demographic characteristics of Lloydminster's migration – in essence a net migration profile. A dummy forecast[11] was prepared using 2001 federal census population data as a basis and then applying cohort-survival techniques to forecast the City's population to 2011. This dummy forecast was then compared to the City's actual 2011 federal census population with the difference – or residual – used to ascertain the profile of Lloydminster's net migration.

Figure 8 compares the dummy forecast to the City's actual population by single year age cohort. The difference between the dummy forecast and the City's actual population represents the profile of Lloydminster's net migration.

[11] For this Growth Study, the dummy forecast projects how Lloydminster's 2001 population would have grown to 2011 if City experienced only natural population change over the 10 years (informed by birth and survival rates) and experienced no in-migration or out-migration over the 10 years.

Figure 8: Actual Population Compared to Forecasted by Single Age Cohort



Key observations from Figure 8

- The late teens, twenties and early thirties represent the age cohort that migrates to the City in the largest numbers.
- Those in their mid-thirties up to their mid-forties also migrated in significant numbers to the City.
- A significant number of pre-school and school aged children are associated with those in their twenties, thirties and forties.
- To a lesser extent, those who are in their retirement age also migrated to the City.
- Overall, Lloydminster is not only experiencing a significant in-migration of young people for work, but slightly older people are also moving to the City with their families.

The results of this approach were used to develop a net migration profile, and were subsequently employed in the population forecasts.

3.2 Alternative Population Growth Scenarios

Table 6 illustrates three sets of alternative population growth forecasts – low, medium and high scenarios – prepared based on the cohort survival model and net migration assumptions described above. Figure 9 depicts the City's historic population growth over the last 40 years with the three scenarios extended to 2041. A summary describing each of the three scenarios is provided following Table 7.

Table 6: Alternative Population Growth Forecasts

Year	Low Scenario			Medium Scenario			High Scenario		
	Pop.	Rate	Change	Pop.	Rate	Change	Pop.	Rate	Change
2011	27,804	–	–	27,804	–	–	27,804	–	–
2016	30,800	10.8%	2.1%	31,721	14.1%	2.7%	32,671	17.5%	3.3%
2021	33,764	9.6%	1.9%	35,750	12.7%	2.4%	37,810	15.7%	3.0%
2026	36,571	8.3%	1.6%	39,742	11.2%	2.1%	43,052	13.9%	2.6%
2031	39,193	7.2%	1.4%	43,643	9.8%	1.9%	48,315	12.2%	2.3%
2036	41,668	6.3%	1.2%	47,477	8.8%	1.7%	53,605	10.9%	2.1%
2041	44,053	5.7%	1.1%	51,307	8.1%	1.6%	58,983	10.0%	1.9%

Figure 9: Alternative Population Growth Forecasts

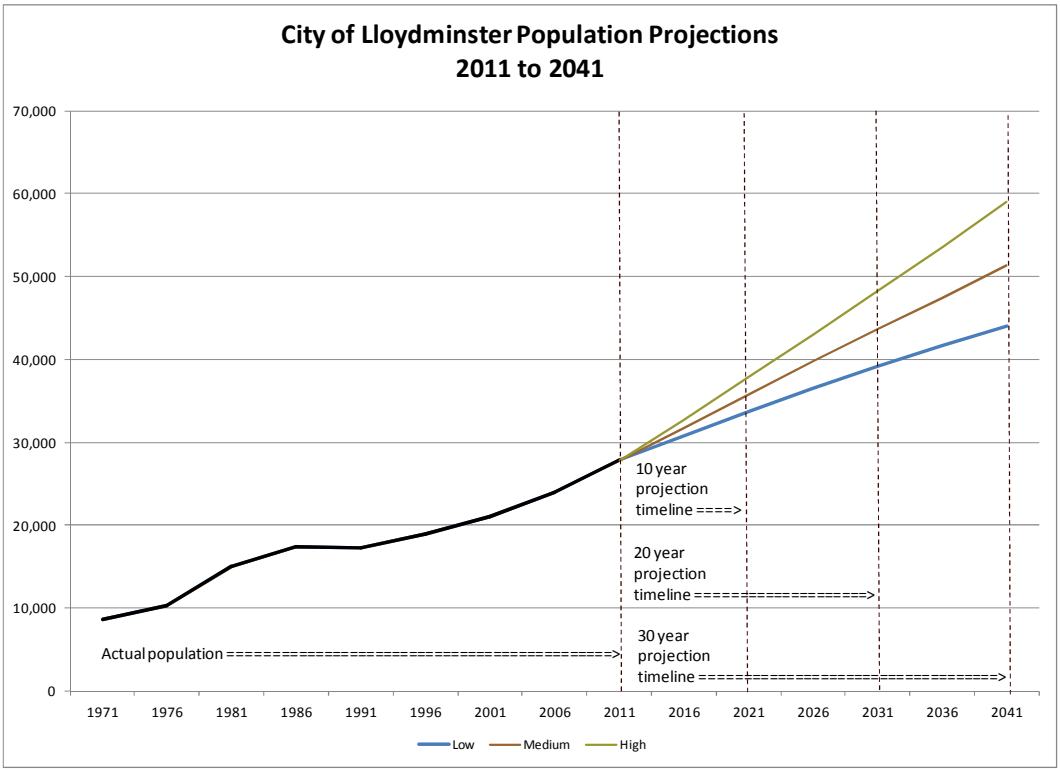


Table 7 illustrates a comparative summary of the three future population growth scenarios. The total population changes, the overall rates of change, and the average annual growth rates are presented for all three scenarios over the 30-year period.

Table 7: Alternative Growth Scenario 30-Year Comparative Summary

	Low Scenario	Medium Scenario	High Scenario
Total Population Change	16,249	23,503	31,179
Overall Rate of Change	58.4%	84.5%	112.1%
Average Annual Growth Rate[12]	1.5%	2.1%	2.5%

3.2.1 Low Scenario

In the "Low Scenario", Lloydminster experiences an average annual growth rate of 1.5% between 2011 and 2041, which is significantly lower than any of the City's historic average annual growth rates over selected timeframes presented in Table 4. The 1.5% average annual growth rate results in an increase of 16,249 to a total forecasted population of 44,053 and an overall change of 58.4% over the 30-year period (see Tables 6 and 7). By comparison, the City grew by 50% in the last 12 years between 2001 and 2013 from 20,988 to 31,483 respectively.

Figure 10 presents the demographic profile of the City's forecasted 2041 population under the "Low Scenario".

Figure 10: Low Scenario Demographic Profile

Low Scenario				
	Current		2041	
Under 15 years	6,025	21.7%	8,511	19.1%
15 to 34 years	9,430	33.9%	12,279	27.6%
35 to 54 years	7,600	27.3%	11,048	24.8%
55 to 74 years	3,455	12.4%	9,014	20.2%
75 years and up	1,300	4.7%	3,682	8.3%

Given Lloydminster's current demographics, its population growth history and the momentum of the City's recent growth, it is highly unlikely that Lloydminster will grow by only 58% over the 30-year forecast period to 2041, particularly when it most recently grew by 50% over the last 12 years.

3.2.2 Medium Scenario

In the "Medium Scenario", Lloydminster experiences an average annual growth rate of 2.1% over the 30-year period to 2041, which replicates the City's 30-year average annual growth rate between 1981 and 2011 presented in Table 4. The 2.1% average annual growth rate results in an increase of 23,503 to a total forecasted population of 51,307 and an overall change of 84.5% by 2041 (see Tables 6 and 7).

Figure 11 presents the demographic profile of the City's forecasted 2041 population under this scenario.

[12] Compounded average annual growth rates.

Figure 11: Medium Scenario Demographic Profile

Medium Scenario

	Current		2041	
Under 15 years	6,025	21.7%	10,317	19.8%
15 to 34 years	9,430	33.9%	15,036	28.9%
35 to 54 years	7,600	27.3%	13,361	25.6%
55 to 74 years	3,455	12.4%	9,482	18.2%
75 years and up	1,300	4.7%	3,898	7.5%

Given Lloydminster's current demographics and recent high levels of growth, it is reasonable that the momentum of the City's recent growth could result in growth greater than 2.1% per year over the next 30 years. In the event 2.1% average annual growth is realized by 2041, an extrapolation of that rate for another 10 years would result in a forecasted population of 62,931 by 2051.

3.2.3 High Scenario

In the "High Scenario", Lloydminster experiences an average annual growth rate of 2.5% between 2011 and 2041, which is in greater alignment with the City's average annual growth rates since 2001. The 1.5% average annual growth rate results in an increase of 31,179 to a total forecasted population 58,983 and an overall change of 112.1% over the 30-year period (see Tables 6 and 7).

Figure 12 presents the demographic profile of the City's forecasted 2041 population under this scenario.

Figure 12: High Scenario Demographic Profile

High Scenario

	Current		2041	
Under 15 years	6,025	21.7%	12,232	20.4%
15 to 34 years	9,430	33.9%	17,969	29.9%
35 to 54 years	7,600	27.3%	15,797	26.3%
55 to 74 years	3,455	12.4%	9,972	16.6%
75 years and up	1,300	4.7%	4,128	6.9%

Given that Lloydminster experienced an average annual growth rate of 3.2% between 1961 and 2011 (see Table 4), it is reasonable for the City to grow at a lesser average annual growth rate of 2.5% over the following 30 years to 2041. This growth rate is also reasonable as Grande Prairie, being Lloydminster's closest comparator municipality as described in Sections 2.2 and 2.3, has itself experienced a modestly higher average annual growth rate of 2.8% since it was slightly smaller than present-day Lloydminster in 1981 (also see Table 4).

3.2.4 Scenario Summary and Recommendations

The three population forecast scenarios provided, based on the Province of Alberta's population forecasts, were developed utilizing a range of assumptions. Although the "Medium Scenario" forecast represents the most likely forecast, the "High Scenario" reflects the very real possibility of greater than expected population growth within the range of growth scenarios that can reasonably be expected.

Prudent long-term planning necessitates that the worst case scenario, or in this situation the "High Scenario", be considered for determining land demand. The worst case scenario is utilized to ensure enough land is available to meet the City's potential high growth requirements.

Should the City's actual 30-year growth not achieve the "High Scenario" growth as forecasted, the City's forecasted "High Scenario" land supply can extend beyond the 30-year horizon to accommodate nearly 40 years of growth under the "Medium Scenario", resulting in the exploration of a subsequent annexation later rather than sooner.

3.3 Housing Needs by Scenario

The population growth forecasts and their breakdowns by age cohort presented in Table 6 and Figures 10 through 12 translate into housing unit forecasts by scenario illustrated in Table 8.

Table 8: Alternative Housing Growth Forecasts by Unit Type

Year	Low Scenario				Medium Scenario				High Scenario			
	Low Density [13]	Multi-Family (Other) [14]	Multi-Family (Apts) [15]	Total	Low Density [13]	Multi-Family (Other) [14]	Multi-Family (Apts) [15]	Total	Low Density [13]	Multi-Family (Other) [14]	Multi-Family (Apts) [15]	Total
2011	8,850	2,305	550	11,705	8,850	2,305	550	11,705	8,850	2,305	550	11,705
2016	9,708	2,392	808	12,908	9,875	2,488	1,016	13,379	10,047	2,587	1,230	13,864
2021	10,473	2,508	1,209	14,190	10,843	2,712	1,637	15,192	11,226	2,924	2,081	16,231
2026	11,023	2,675	1,880	15,578	11,688	2,962	2,454	17,104	12,380	3,261	3,055	18,696
2031	11,449	2,882	2,633	16,964	12,471	3,235	3,308	19,014	13,541	3,608	4,021	21,170
2036	11,899	3,074	3,251	18,224	13,296	3,500	4,040	20,836	14,768	3,951	4,878	23,597
2041	12,389	3,221	3,771	19,381	14,153	3,739	4,731	22,623	16,017	4,290	5,752	26,059

Key observations from Table 8

- To accommodate its forecasted population growth under the "Low Scenario", the City will require 7,676 additional dwelling units for a total of 19,381 dwelling units by 2041, an increase of 66%.
- Under the "Medium Scenario", the City will require 10,918 additional dwelling units for a total of 22,623 dwelling units by 2041, an increase of 93%.
- Under the "High Scenario", the City will require 14,354 additional dwelling units for a total of 26,059 dwelling units by 2041, an increase of 123%.

3.4 Alternative Employment Growth Scenarios

Table 9 illustrates three sets of alternative employment growth forecasts that correspond with the low, medium and high scenarios of population growth presented in Section 3.3.

[13] Low Density includes single and semi-detached housing, duplexes and manufactured homes.
[14] Multi-Family (Other) includes triplexes, fourplexes and town houses (row and stacked).
[15] Multi-Family (Apts) includes apartments.

Table 9: Alternative Employment Growth Forecasts by Industry Sector

Year	Low Scenario						Medium Scenario						High Scenario					
	Primary Industries	Manufacturing and Construction	Retail and Wholesale Trade	Public Services	Business Services	Total	Primary Industries	Manufacturing and Construction	Retail and Wholesale Trade	Public Services	Business Services	Total	Primary Industries	Manufacturing and Construction	Retail and Wholesale Trade	Public Services	Business Services	Total
2011	4,102	2,431	3,952	3,062	4,539	18,086	4,102	2,431	3,952	3,062	4,539	18,086	4,102	2,431	3,952	3,062	4,539	18,086
2016	4,603	2,656	4,255	3,274	4,907	19,695	4,858	2,749	4,352	3,329	5,034	20,322	5,127	2,844	4,450	3,384	5,164	20,969
2021	5,144	2,872	4,511	3,437	5,229	21,193	5,704	3,069	4,709	3,545	5,493	22,520	6,291	3,273	4,911	3,654	5,765	23,894
2026	5,727	3,093	4,759	3,587	5,547	22,713	6,625	3,401	5,056	3,742	5,950	24,774	7,568	3,722	5,364	3,902	6,369	26,925
2031	6,204	3,289	4,999	3,744	5,847	24,083	7,451	3,715	5,409	3,957	6,403	26,935	8,762	4,163	5,839	4,180	6,987	29,931
2036	6,674	3,497	5,272	3,933	6,181	25,557	8,309	4,058	5,816	4,217	6,916	29,316	10,025	4,648	6,391	4,521	7,693	33,278
2041	7,017	3,660	5,500	4,096	6,453	26,726	9,059	4,370	6,205	4,475	7,399	31,508	11,209	5,121	6,954	4,881	8,402	36,567

Key observations from Table 9

- To accommodate its forecasted population growth under the "Low Scenario", the City will require 8,640 additional jobs for a total of 26,726 jobs by 2041, an increase of 48%.
- Under the "Medium Scenario", the City will require 13,422 additional jobs for a total of 31,508 jobs by 2041, an increase of 74%.
- Under the "High Scenario", the City will require 18,481 additional jobs for a total of 36,567 jobs by 2041, an increase of 102%.

4.0 Status of City Lands

4.1 Current Land Supply

As summarized in Table 10 and illustrated in Map 2, Lloydminster has 2,915.6 ha of absorbed lands.[16] The amount of gross available lands[17] within the current City limits totals 1,339.1 hectares (ha), excluding pipelines and well setbacks. This amounts to 30.9% of the City's total land base of 4,338.0 ha.

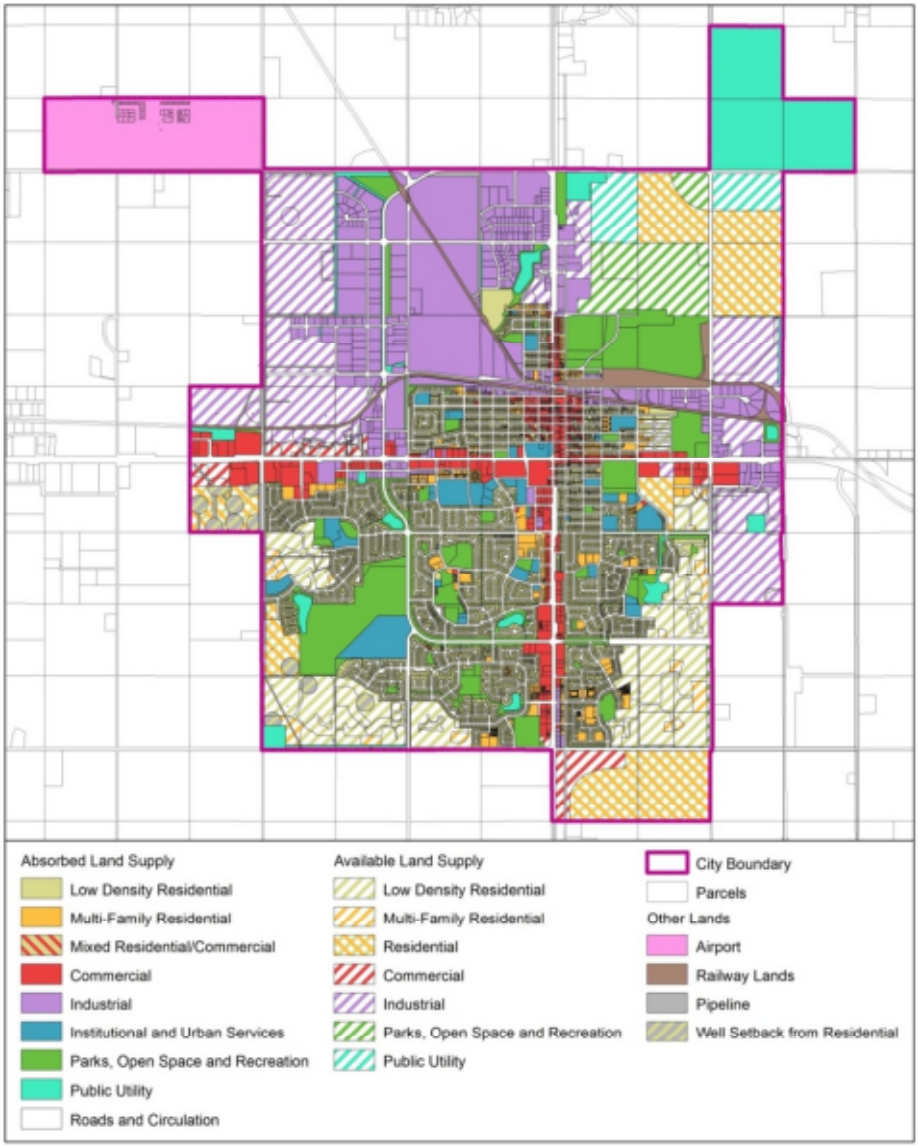
Table 10: Absorbed and Available Land Supply

Land Use	Absorbed Lands[16] (ha)	Percent (%)	Gross Available Lands[17] (ha)	Percent (%)	Net Available Lands[17] (ha)	Percent (%)
Low Density Residential[19]	510.0	19.2%	554.0	41.4%	360.1	46.8%
Multi-Family Residential[20]	90.5	3.4%	81.1	6.1%	52.7	6.9%
Total Residential	**600.5**	**22.6%**	**635.1**	**47.4%**	**412.8**	**53.7%**
Commercial	179.0	6.7%	54.0	4.0%	37.8	4.9%
Industrial	570.5	21.5%	455.3	34.0%	318.7	41.4%
Institutional and Urban Services	106.0	4.0%	–	–	–	–
Total Net Developable	**1,455.9**	**54.9%**	**–**	**–**	**769.3**	**100.0%**
Parks, Open Space and Recreation	357.5	13.5%	122.6	9.2%	237.0	–
Public Utilities	271.4	10.2%	72.1	5.4%	186.5	–
Roads and Circulation	567.7	21.4%	–	–	146.2	–
Total Gross Developable	**2,652.4**	**100.0%**	**1,339.1**	**100.0%**	**1,339.1**	**–**
Airport	195.0	–	–	–	–	–
Railway Lands	68.2	–	–	–	–	–
Pipelines	–	–	36.1	–	36.1	–
Well Setbacks	–	–	47.1	–	47.1	–
Total	**2,915.6**	**–**	**1,422.4**	**–**	**1,422.4**	**–**

[16] Absorbed lands include those lands zoned (under the Land Use Bylaw) and subdivided for development.
[17] Available lands include those lands not yet zoned and subdivided for development. Land uses within unabsorbed lands are based on the City's Land Use Bylaw, outline plans and area structure plans in effect, the Municipal Development Plan, the 2009 Growth Study and directions from City Administration.

By subtracting an assumed 35%[18] from the available gross developable Low Density Residential[19] and Multi-Family Residential[20] lands, and subtracting an assumed 30%[21] from the available gross developable Commercial and Industrial lands, the amount of net available lands available within the current City limits totals approximately 769.3 ha. This is the equivalent of 17.7% of the City's total land base.

Map 2: Current Land Supply



[18] For residential lands, this 35% deduction assumes 10% for municipal and school reserves, 10% for public utilities and 15% for roads and circulation.
[19] Low Density Residential includes single detached, semi-detached and duplex dwellings.
[20] Multi-Family Residential includes triplexes, fourplexes, row housing, stacked row housing and apartments.
[21] For non-residential (commercial and industrial) lands, this 30% deduction assumes 10% for municipal and school reserves, 10% for public utilities and 10% for roads and circulation.

Table 11 presents the breakdown of gross available residential, commercial and industrial lands by province. Nearly 70% of the gross available residential lands are on the Saskatchewan side of the City, while nearly 60% of the gross available industrial lands are on the Alberta side of the City. The City has nearly an equidistant amount of gross available commercial lands on both sides of the provincial boundary. Overall, 56.6% of Lloydminster's total gross available lands are within Saskatchewan while 43.4% are within Alberta.

Table 11: Gross Available Lands by Province

Land Supply	Alberta		Saskatchewan		Total Available Lands (ha)
	Area (ha)	Percent	Area (ha)	Percent	
Residential	201.0	31.6%	434.1	68.4%	635.1
Commercial	27.1	50.2%	26.9	49.8%	54.0
Industrial	268.9	59.1%	186.4	40.5%	455.3
Total Available Lands	**497.0**	**43.4%**	**647.4**	**56.6%**	**1,144.4**

4.2 Depletion Forecast of Available Land Supply

Table 12 presents the estimated amount of years to land supply depletion if annexation were not to occur.

Table 12: Years to Land Supply Depletion without Annexation

Land Supply	High Scenario	
	Year Depleted	Years to Depletion
Low Density Residential	2035	22
Multi-Family Residential	2032	19
Commercial	2015	2
Industrial	2018	5

As presented in Table 12, based on the available land supply estimates from Table 10, it will take 22 years (2035) for the City's Low Density Residential land supply to be depleted by subdivision under the recommended "High Scenario" if no annexation was to occur, while it will take 19 years (2032) to deplete the City's Multi-Family Residential land supply. In terms of non-residential development, it will take 2 years (2015) and 5 years (2018) for the City's Commercial and Industrial land supplies respectively to be depleted by subdivision under the "High Scenario" if no annexation was to occur.

4.3 Historic Land Absorption

An historic land absorption analysis enables an understanding of how land has been consumed through the subdivision registration process over a certain period of time. Extrapolation of the results allows the estimation of the earliest time in which all available lands could be depleted under two key assumptions – that there will be flexibility of land use among the City's remaining available lands (unlike the situation in Section 4.2 above), and that all owners of these lands will participate in development. For the purpose of this *Growth Study*, Lloydminster's historical land absorption analysis was undertaken by calculating the total area of all subdivision plans registered over the past 30 years in 10-year intervals.

As presented in Table 13 and illustrated in Map 3, the total amount of lands absorbed between 2003 and 2012 inclusive was 677.6 ha, resulting in an average annual absorption rate of 67.8 ha (~1 quarter section) per year. With a gross developable land supply of 1,339.1 ha (Table 10), it will take 20 years to absorb these lands through subdivision registration based on this rate of 67.8 ha per year remaining constant. It is reasonable to expect that the recent annual absorption rate will remain be at least 67.8 ha per year at

minimum over the next 10 years and beyond, given how the average annual absorption by decade has nearly more than doubled since the 1993-2002 period.

Table 13: Historical Land Absorption

10-year period	City of Lloydminster		Alberta Portion		Saskatchewan Portion	
	Total Land Absorbed (ha)	Avg. Annual Absorption (ha)	Total Land Absorbed (ha)	Avg. Annual Absorption (ha)	Total Land Absorbed (ha)	Avg. Annual Absorption (ha)
1983-1992	522.9	52.3	428.9	42.9	94.0	9.4
1993-2002	255.7	25.6	223.5	22.4	32.2	3.2
2003-2012	677.6	67.8	449.9	45.0	227.8	22.8
Total	**1,456.3**	**48.5**	**1,102.3**	**36.7**	**354.0**	**11.8**

Key observation

- Based on current absorption rates of 67.8 ha per year, all of the City's remaining developable lands (1,339.1 ha) will be absorbed before the end of 2032 (20 years).

Map 3: Historic Land Absorption by Registered Plan

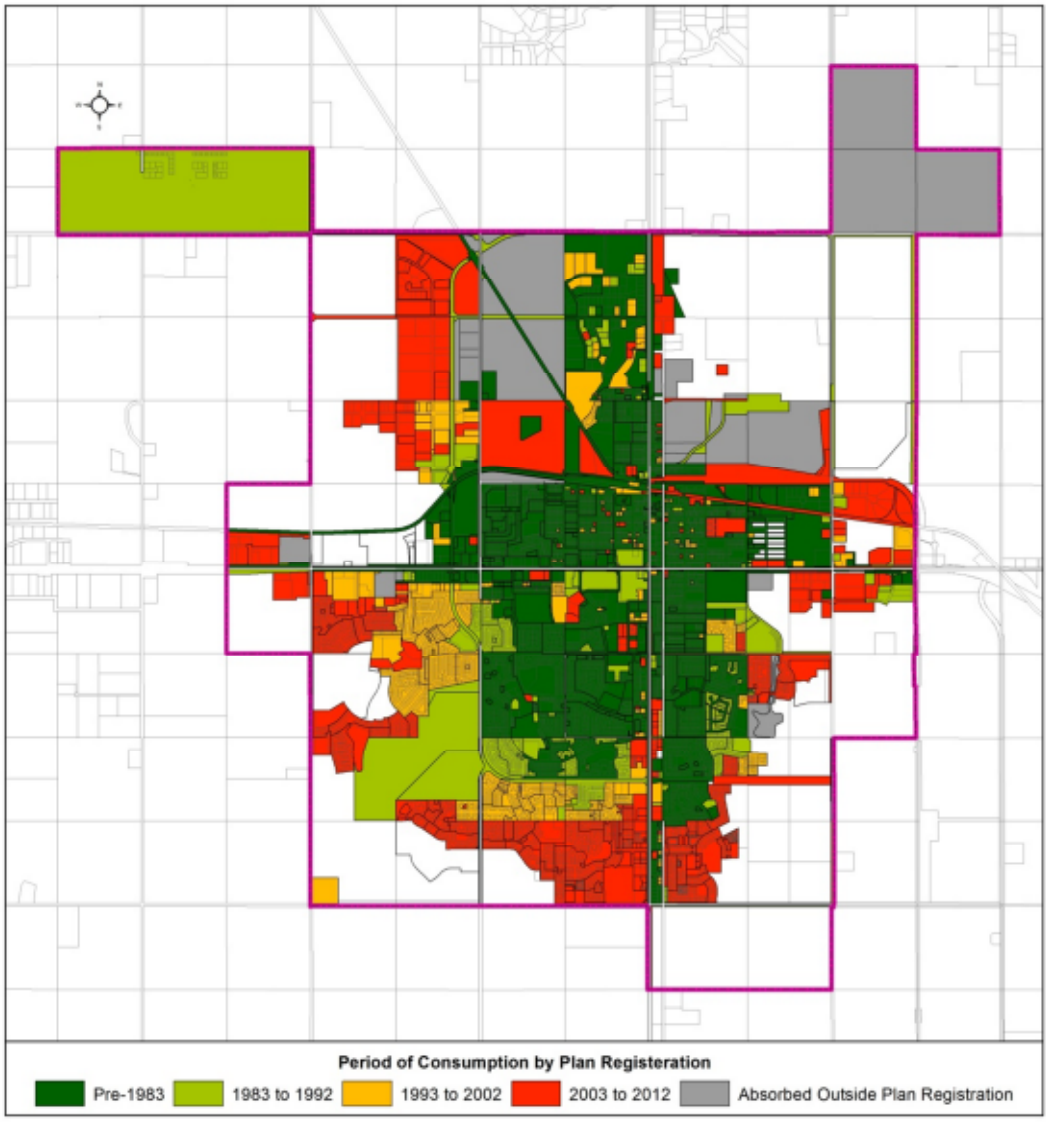


Table 14 presents the net residential and estimated gross residential land absorption by province. Nearly 70% of the residential lands that were registered within the 1983-1992 and 2003-2012 time periods are on the Alberta side of the City. This jumped to just over 90% in the 1993-2002 time period. Overall, 76.1% of Lloydminster's total residential lands registered in the past 30 years are located within Alberta.

Table 14: Residential Land Absorption by Province

Land Supply	Alberta portion			Saskatchewan portion			Total City	
	Net Area (ha)	Gross Area (ha)	Percent	Net Area (ha)	Gross Area (ha)	Percent	Net Area (ha)	Gross Area (ha)
1983-1992	39.8	61.2	69.2%	17.7	27.2	30.8%	57.5	88.5
1993-2002	117.4	180.6	90.2%	12.6	19.4	9.8%	130.1	200.0
2003-2012	149.4	229.8	69.5%	65.7	101.1	39.5%	215.1	330.9
30-Year Total	**306.6**	**471.7**	**76.1%**	**96.0**	**147.7**	**23.9%**	**402.7**	**619.4**

Key observations

- Over the past 30 years, the total amount of net residential land registered by subdivision for development in Alberta has outpaced Saskatchewan at a ratio of 3:1.
- Over the past 10 years, the Alberta portion of Lloydminster has experienced a gross residential absorption rate of 23.0 ha per year. If this rate was to remain constant, it would take less than 9 years (2021) to absorb the remaining 201.0 ha of gross available residential lands (refer to Table 10) within Alberta.

4.4 Population Capacity

To determine the population capacity of the City, an understanding of the population density within its currently absorbed residential lands is necessary. Table 15 presents the minimum population density of Lloydminster's absorbed residential lands using the 2011 federal census population count of 27,804. As shown, Lloydminster has a population density of at least 46.3 people per net residential hectare.[22]

Table 15: Population Density of Absorbed Residential Lands

	Area (ha)
Net Residential Land	600.5
2012 Population	27,804
Population density (people per net ha)	**46.3**

Table 16 presents the estimated population capacity of the City's estimated available net residential lands, and therefore the City's estimated overall population capacity, based on the population density presented in Table 15.

[22] The total absorbed residential lands are as of the end of 2012, while the latest census count is as of May 10, 2011. The population density of 46.8 people per net residential hectare is therefore a minimum as a 2012 population for the City is not available.

Table 16: Estimated Population Capacity within City Limits

	Area (ha)	Population Density (people/ha)	Population
Absorbed Net Residential Lands	600.5	46.3	27,804
Available Net Residential Lands	412.8	46.3	19,113
Total Net Residential Lands	**1,013.3**	**46.3**	**46,917**

Lloydminster's available lands are estimated to accommodate a population of approximately 19,113 additional people, resulting in a total estimated population capacity within the current City limits of 46,917.

4.5 Estimated Years to Population Capacity

Table 17 compares the City's estimated population capacity with the 30-year future population growth scenarios that were outlined in Table 6.

Table 17: Years to Population Capacity within City Limits

	Low Scenario	Medium Scenario	High Scenario
30-Year Total Population (2041)	44,053	51,307	58,983
Total Population Capacity	46,917	46,917	46,917
Additional Population Required Outside City Limits	**(2,864)**	**4,390**	**12,066**
Year Capacity Reached	**2049**	**2036**	**2030**
Years to Capacity (from 2013)	**36**	**23**	**17**

Key observation

- The City's current land supply is insufficient to accommodate 30 years of additional population growth under the "Medium Scenario" or the "High Scenario".

4.6 Residential Lands

At present, the City has a net residential land supply of 412.8 ha to accommodate population growth as noted in Table 10. Under the "High Scenario", these lands will be consumed within 19-22 years (2032-2035) assuming all landowners within the City will participate in development (see Table 12).

It is prudent that annexation be initiated at this time to maintain a 30-year residential land supply on both sides of the City. Furthermore, it is not good planning for an urban municipality to maintain a less than 20-year residential land supply. The City needs to provide sufficient residential land supply to develop housing to accommodate the population growth forecasted in the "High Scenario".

4.7 Commercial and Industrial Lands

As of 2011, the City of Lloydminster has a municipal assessment split of 65% residential to 35% non-residential (commercial and industrial). It is the City's desire to maintain this municipal assessment split so that there is no increased proportional tax burden on the City's residential ratepayers.

At present, the City has only 37.8 net ha of commercial land available for subdivision, while it has 318.7 net ha of industrial land available for subdivision as noted in Table 10. Under the "High Scenario", the commercial lands will be subdivided for consumption by the end of 2015, while the industrial lands will be subdivided for consumed by 2018.

It is prudent that annexation be initiated at this time to expedite expansion of Lloydminster's commercial and industrial land supplies for the short-term. Otherwise, the City will have no ability to subdivided land for future commercial and industrial growth at appropriate locations beyond 2015 and 2018 respectively, and maintenance of its current municipal assessment split will therefore be compromised. It is not good planning for an urban municipality to maintain less than 5-year commercial and industrial land supplies.

4.8 Institutional and Urban Service Lands

Though Table 10 does not specifically allocate available lands for institutional and urban service uses, it is assumed that a portion of the residential land requirements will accommodate some of these uses (e.g., schools on municipal reserve sites). The remaining institutional and urban service land requirements are anticipated to be interspersed throughout future residential, commercial and industrial growth areas as facilities such as churches, fire stations, post-secondary institutions, hospitals, etc. These requirements will therefore further erode the net land supplies to accommodate future residential, commercial and industrial growth within the City limits as they cannot be accommodated on municipal reserve lands that have already been factored into the growth scenarios. This results in the consumption of available lands with timeframes earlier than those presented in Sections 4.6 and 4.7 above.

4.9 Airport Lands

The City of Lloydminster has plans to extend the runway at its municipal airport. To do so, the City recently expropriated the southern half of SW-16-50-1-W4M (Block A, Plan 094 0898) to the west of the airport from a landowner within the County of Vermilion River. As the City is now the current owner the property and intends to extend the runway onto it in the short-term, the City intends to annex the property into its jurisdiction. In addition, the northern balance of the subject quarter section is required to accommodate medium to long-term airport-related development along the future runway extension.

5.0 Serviceability

In support of this *Growth Study*, an associated *Servicing Assessment* was undertaken by ISL to determine the serviceability of the same study area with respect to the logical extension of stormwater, wastewater, water and transportation infrastructure. The *Servicing Assessment* involved a review of the City's four applicable master plans,[23] a serviceability analysis and a summary assessment. The following two sections summarize the results of the Servicing Assessment. The results of the *Servicing Assessment* informed the determination of the proposed annexation areas presented in Section 8.0.

5.1 Stormwater, Wastewater and Water

The *Servicing Assessment* associated with this *Growth Study* analyzed the overall serviceability of each quarter section within the study area in terms of stormwater, wastewater and water and ranked it using a coding system. Beyond Lloydminster's current City limits, the areas with the least short-term servicing constraints, based on the aggregated coding among the three utilities, were:

- The four quarter sections in the RM of Britannia No. 502 east of Highway 17 and north of 67 Street;
- The quarter section on the northwest corner of Highway 17 and 67 Street in the County of Vermilion River; and
- The quarter section on the north side of Highway 16 adjacent to the current City limits.

The areas with medium-term servicing constraints, based on the aggregated coding, were:

- The seven remaining quarter sections in the County of Vermilion River north of 67 Street between Highway 17 to the east and 75 Avenue (Range Road 12) to the west;
- The three quarter sections in the County west of 75 Avenue south of the airport;
- Approximately four quarter sections in the County west of the City including 2.5 quarters fronting Highway 16;
- Nearly seven full quarter sections in the County south of 12 Street between Highway 17 to the east and 75 Avenue (Range Road 12) to the west; and
- The approximately 2.2 quarter sections within the RM of Wilton No. 472 between Highway 17 and 40 Avenue.

The balance of the study area to the southwest of the City, approximately 17 quarter sections, was deemed to have long-term servicing constraints due to their location within a different water pressure zone requiring a new pumphouse and reservoir or booster stations.

The following conclusions were drawn from the *Servicing Assessment*, based on the City's applicable utility master plans.

- While the ultimate stormwater management system will comprise substantial infrastructure, interim servicing schemes (e.g. interim discharge locations, possibly with oversized/staged ponds) may be possible to economically service development in areas where there are otherwise few constraints. An assessment can be made at the time of development.
- Regarding wastewater, timely implementation of the West Trunk construction, East Trunk twinning, and North Trunk/WWTP Outfall twinning will enable sanitary servicing in the study area. Note that the WWTP Outfall and East Trunk twinning may be required immediately (pending confirmation with flow monitoring), and the West Trunk construction will be required shortly. The timing of the North Trunk twinning depends on location of development throughout the City. Flow monitoring is recommended.

[23] The four master plans reviewed were the City's *Storm Drainage Master Plan* (2009), *Water Distribution Study* (2009), *Sanitary Sewer Master Plan* (2009) and *Transportation Infrastructure Master Plan* (2010).

- Upgrades to Water Treatment Plant 2 and the West Reservoir, as well as construction of the 750 mm Dedicated Fill Line, are required at present to ensure reliable water supply for the entire City. Development anywhere in the City is dependent on these upgrades.
- The future Water Pressure Zone 2 (West) Water Reservoir and Pumphouse will be necessary to service much of the Central and South Urban Expansion Areas to the southwest of the City. This major infrastructure requirement will constrain development within the Water Pressure Zone 2 area. Interim booster station servicing options from Water Pressue Zone 1 (Central) could be explored at the time of development, pending implementation of water supply upgrades associated with the 750 mm Dedicated Fill Line mentioned above.

5.2 Transportation

The *Servicing Assessment* associated with this *Growth Study* also analyzed the overall serviceability of each quarter section within the study area in terms of transportation based on a coding system. Beyond Lloydminster's current City limits, the areas with the least short-term transportation servicing constraints (coded as 1 and 2) were:

- The four quarter sections in the RM of Britannia No. 502 east of Highway 17 and north of 67 Street;
- The two quarter sections in the County of Vermilion River on the west side of Highway 17 north of the City;
- The two quarter sections in the County north of 67 Street on either side of 59 Avenue (Range Road 11);
- The four quarter sections in the County on either side of Highway 16 in the County west of the City;
- The three quarter sections in the County on the west side of 75 Avenue north of 12 Street (Township Road 494);
- The four quarter sections in the County on the west side of Highway 17 south of the City; and
- The approximately 2.2 quarter sections within the RM of Wilton No. 472 between Highway 17 and 40 Avenue.

The areas with the medium-term transportation servicing constraints (coded as 3) were:

- The four remaining quarter sections in the County of Vermilion River north of 67 Street between Highway 17 to the east and 75 Avenue (Range Road 12) to the west;
- The three quarter sections in the County west of 75 Avenue south of the airport;
- Approximately 5.5 quarter sections in the County west of 75 Avenue between Highway 16 to the north and 12 Street (Township Road 494) to the south;
- The two quarter sections in the County west of 59 Avenue (Range Road 11) between 12 Street to the north and the future Highway 16 bypass to the south; and
- The two quarter sections in the County south of 12 Street (Township Road 494) on either side of 75 Avenue (Range Road 12).

The balance of the study area to the southwest of the City, approximately 8 quarter sections, was deemed to have long-term servicing constraints due to their locations being significant removed from existing arterial roads and highways.

The following conclusions were drawn from the *Servicing Assessment*, based on the City's *Transportation Infrastructure Master Plan* (TIMP).

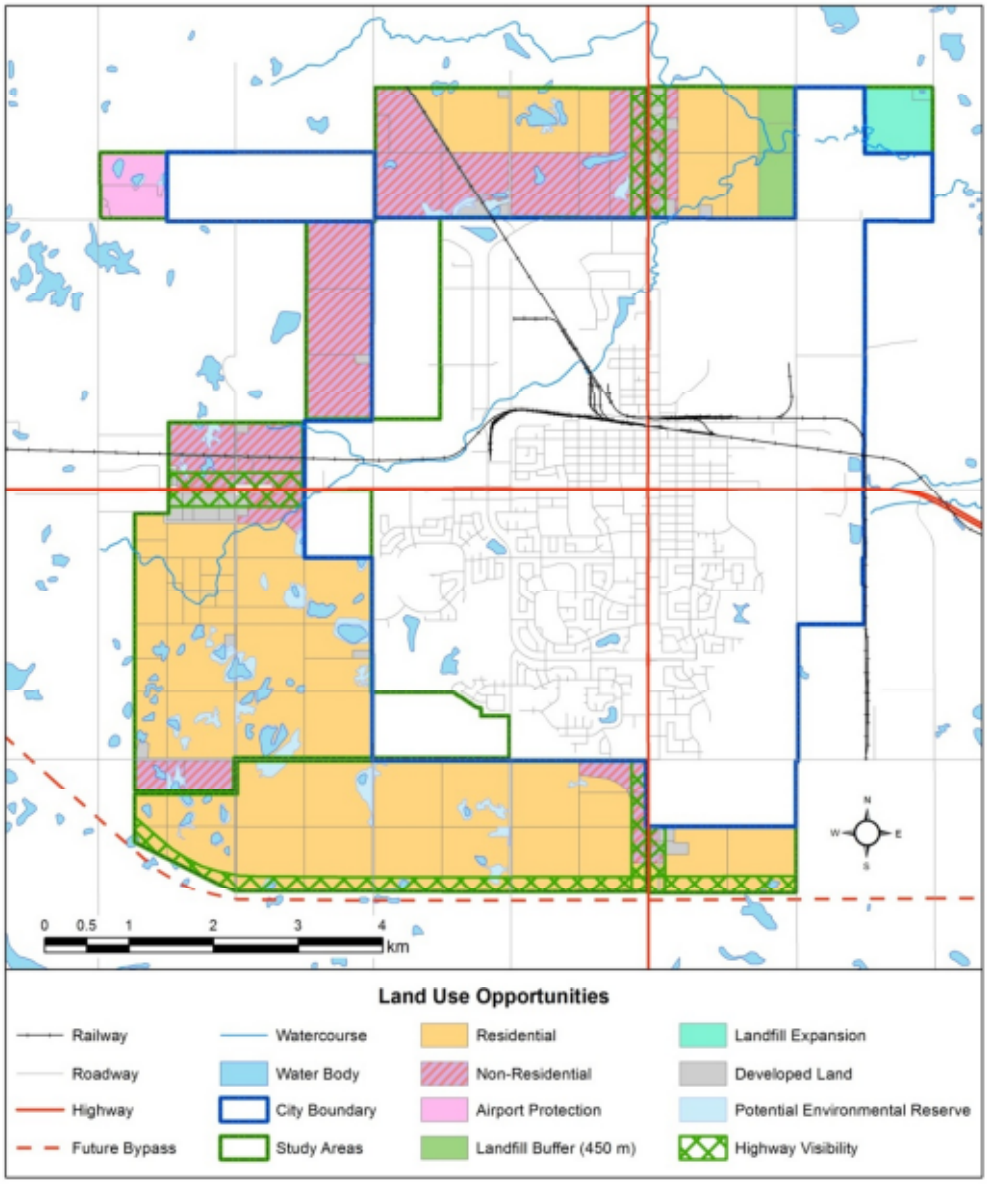
- Widening of 75 Avenue from 44 Street to 52 Street and the westward extensions of 62 Street and 52 Street to 75 Avenue should occur within a ten-year capital improvement plan (retroactive to 2010 being the year of the TIMP) to service the portion of the North Urban Expansion Area between Highway 16 to the south and 67 Street to the north.
- Significant roadway improvements are required to service the full build-out of the study area beyond the 2010 ten-year capital improvement plan. The timing of roadway improvements should be determined by the next update of the TIMP.

6.0 Opportunities and Constraints

An opportunities and constraints analysis was undertaken to assist in determining an annexation area and a preliminary land use breakdown for the annexation area. Land use and infrastructure opportunities and constraints were determined and mapped. Some of these opportunities and constraints were determined through the *Environmental Inventory* and *Servicing Assessment* associated with this *Growth Study*.

6.1 Land Use Opportunities

Map 4: Land Use Opportunities



Map 4 illustrates the land use opportunities within the study area. The Residential, Non-Residential (commercial and industrial) and Airport Protection land uses within the portion of the study area west of Highway 17 are based on the *County of Vermilion River and City of Lloydminster Intermunicipal Development Plan* (IDP). The Residential, Non-Residential, Landfill Buffer and Landfill Expansion land uses within the portion of the study area east of Highway 17 are based on Lloydminster's *Growth Study 2009*, approved by City Council in early 2012.

For reference purposes, Map 4 also distinguishes those lands that are presently developed from the IDP-prescribed land uses. Further, Class IV and V wetlands identified in the associated *Environmental Inventory* that are 1.0 ha in size or greater are identified as Potential Environmental Reserve (Alberta portion of study area only). For more information on these wetlands, see the *Environmental Inventory of Potential Expansion Lands West of Lloydminster, AB/SK* (July 2013) report prepared by Spencer Environmental Management Services Ltd.

Map 4 also illustrates Highway Visibility corridors along Highway 16 to the west of the City, Highway 17 both to the north and south of the City, and along the north side of the future Highway 16 bypass to the south of the City. These corridors afford the opportunity for commercial development due to visibility from highway traffic. This does not necessarily mean however that access to these highways will be readily available for commercial development.

6.2 Land Use Constraints

Map 5 illustrates known land use constraints within and in some cases beyond the study area that may have impacts on those lands within the study area. Significant existing developments or structures are identified based on review of 2011 aerial imagery provided by the City of Lloydminster. Those lands within the study area that have been subject to fragmentation through past subdivision have also been identified.

Map 5 also illustrates various natural and constructed land use constraints arising out of the associated *Environmental Inventory*. Natural land use constraints from the *Environmental Inventory* include Class IV and V wetlands that are 1.0 ha in size or greater (Alberta portion of study area only). Constructed land use constraints from the *Environmental Inventory* include the approximate locations of oil and gas wells within both provinces, as well as the approximate alignments of pipelines within the Alberta portion of the study area, excluding low pressure distribution lines. The alignments of pipelines within Saskatchewan are not included as they were not readily available to the City. For more information on the methodologies, sources and currency of these natural and constructed constraint data sets, see the *Environmental Inventory of Potential Expansion Lands West of Lloydminster, AB/SK* (July 2013) report prepared by Spencer Environmental Management Services Ltd.

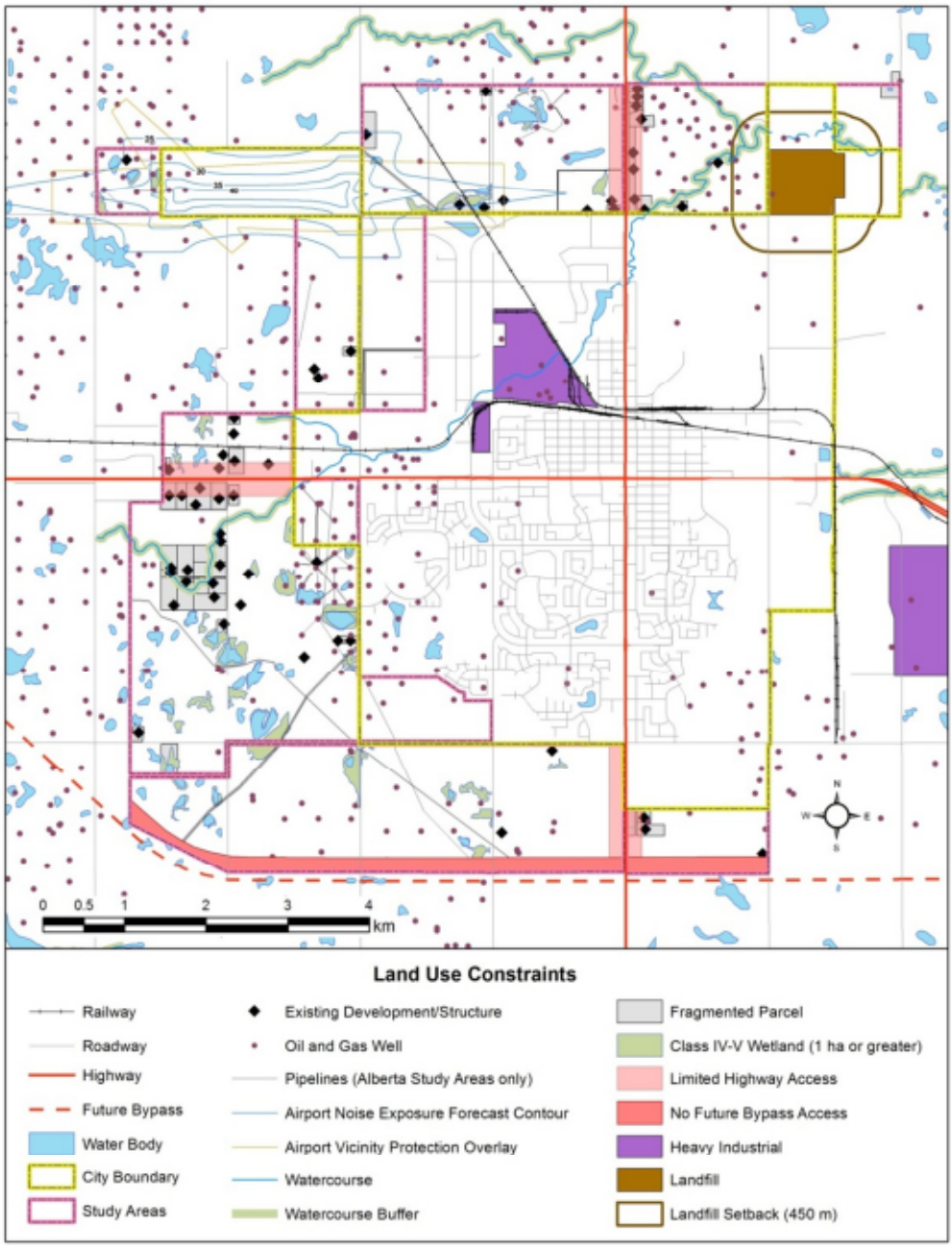
Other natural constraints illustrated within Map 5 include water bodies and watercourses. These datasets are from GeoBase's National Hydro Network. The exact locations and configurations of water bodies and the alignments of watercourses are considered approximate and may not be exhaustive. These should be confirmed through a detailed site investigation and survey. Further, the extent of the buffers required adjacent to water bodies and along watercourses are to be prescribed by the Alberta Environment and Sustainable Resource Development and the Saskatchewan equivalent at the subdivision stage.

Land use constraints that relate to the City's airport include the outer extent of its airport vicinity protection overlay (AVPO) and its noise exposure forecast (NEF) contours. Both of the AVPO and NEF contour datasets were provided by the City of Lloydminster. Building height restrictions apply within the AVPO, becoming increasingly more restrictive toward the airstrip itself. Transport Canada states the following regarding Noise NEF contours:

"Transport Canada does not support or advocate incompatible land use (especially residential housing) in areas affected by aircraft noise. These areas may begin as low as NEF 25. At NEF 30, speech interference

and annoyance caused by aircraft noise are, on average, established and growing. By NEF 35 these effects are very significant. New residential development is therefore not compatible with NEF 30 and above, and should not be undertaken."[24]

Map 5: Land Use Constraints



[24] Source: "*Aviation: Land Use in the Vicinity of Airports*". Eighth edition. Section 4.2.1: Noise Exposure Forecast (NEF). Ottawa: Transport Canada. 2005. p. 26.

Other land use constraints illustrated within Map 5 include the locations of existing heavy industrial development and the current extent of the City's landfill. Both of these features generate land use conflicts beyond their sites. The Province of Saskatchewan legislates a 450 m development setback between landfills and certain land uses.

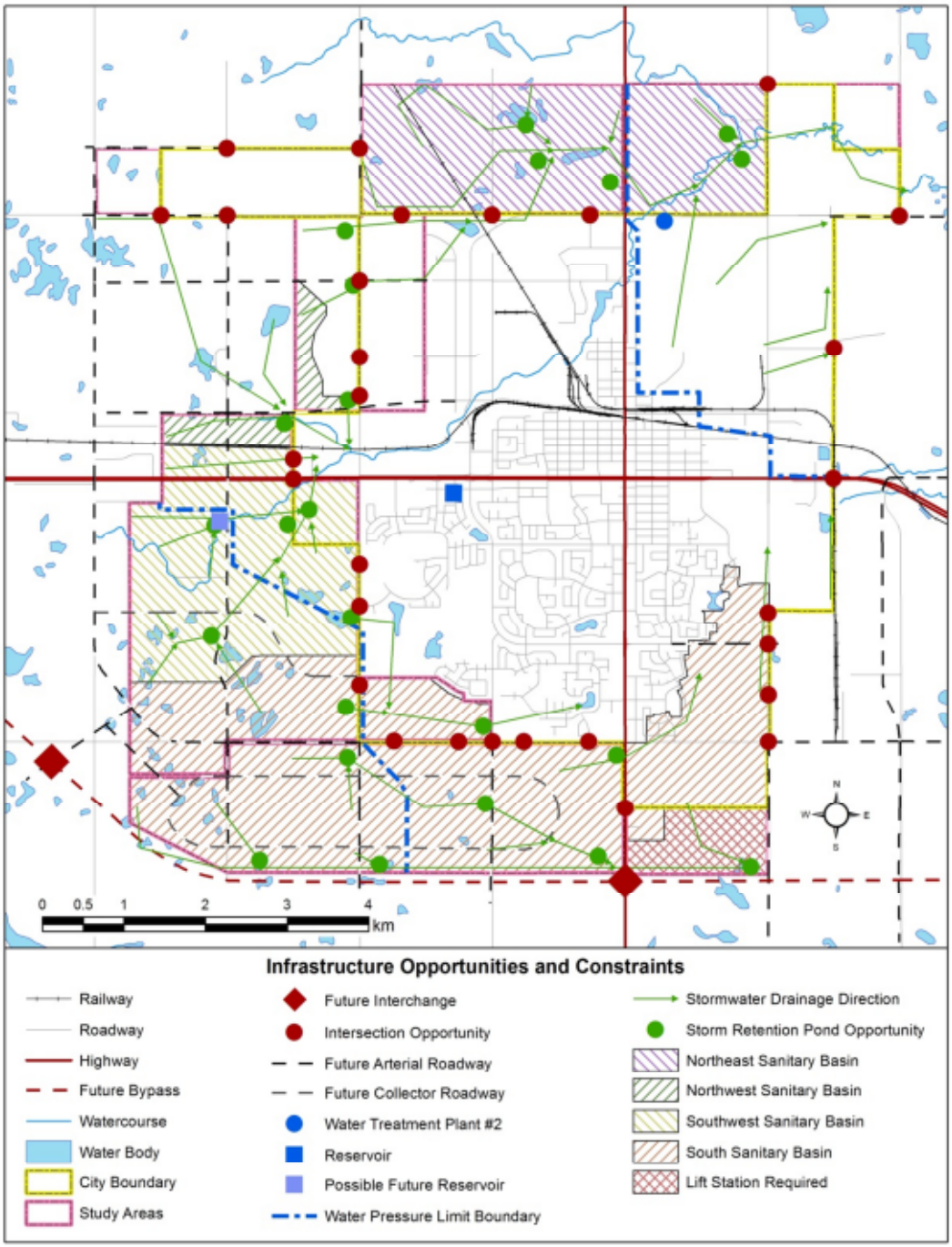
Finally, there are transportation corridors within the study area that may have limited to no vehicular access opportunities. These corridors are located along Highway 16 to the west of the City, Highway 17 both to the north and south of the City, and along the north side of the future Highway 16 bypass to the south of the City. If portions of the existing Highway 16 and Highway 17 corridors are annexed, vehicular access could be improved through the City gaining jurisdiction and control over their function.

6.3 Infrastructure Opportunities and Constraints

Map 6 illustrates known infrastructure opportunities and constraints within the study area. The two future interchanges are prescribed by the functional planning study for the realignment of Highway 16. The intersection opportunities at the edges of the current City limits reflect existing intersections, as well as planned intersections per the City's adoption of land use outline plans and area structure plans. Future collector and arterial roadways are derived from the City's *Transportation Infrastructure Master Plan* (2010).

In terms of utility infrastructure, the location of the existing water treatment plant and reservoir are illustrated in Map 6. The water pressure limit boundaries and the conceptual location of a possible future reservoir to service the southwest water pressure zone are based on the City's *Water Distribution Study* (2009). The storm retention pond opportunities and the stormwater drainage directions illustrated in Map 6 are based on and conceptualized from the City's *Storm Drainage Master Plan* (2009). The four conceptual sanitary basins and the conceptual area in which a lift station would be required for sanitary servicing are based on the same illustrated within the City's *Sanitary Sewer Master Plan* (2009). For more information on the transportation, water, stormwater and wastewater infrastructure opportunities and constraints within the study area, refer to the four above mentioned master plans and the *Lloydminster Servicing Assessment* (August 2013) prepared by ISL Engineering and Land Services that is associated with this *Growth Study*.

Map 6: Infrastructure Opportunities and Constraints



7.0 Density Scenarios and Growth Assumptions

7.1 Residential Density Scenarios

The City of Lloydminster's *Growth Study 2009*, approved by City Council in January 2012, indicated the average density of all 12 of the City's neighbourhoods was 17.3 dwelling units per net residential hectare (du/nrha).[25] Meanwhile, *e*^{4} *Lloydminster 2012-2032*, the City's Municipal Development Plan (MDP), indicates the City's average residential density is 18 du/nrha.[26] The City's MDP includes policy directing that new neighbourhoods be designed to accommodate densities of 17-21 du/nrha.[27] For the purpose of this new *Growth Study*, two residential density scenarios were considered for determining future residential land requirements based on this MDP policy.

7.1.1 MDP Average Residential Density Scenario

Notwithstanding that the City's average residential density is approximately 18 du/nrha, the planning of future City neighbourhoods will be guided by the City's new MDP. Therefore, this *Growth Study* assumes that the average density of all new residential development will be 19 du/nrha, which is the mid-point of the MDP policy described above. This "MDP Average Residential Density Scenario" results in a 5.6% increase in density over the current average density of 18 du/nrha. This increase would result in a modestly more efficient use of land than current development patterns, as well as marginally slowing the conversion of agricultural lands for residential development purposes.

7.1.2 MDP Higher Residential Density Scenario

This "MDP Higher Residential Density Scenario" assumes that an average density of 21 du/nrha is achieved for all new residential development moving forward. This density represents the high end of the MDP policy and a more significant 16.7% increase over the current average residential density. As a result, an even more efficient use of land will be realized under this scenario, and the rate of agricultural land consumption will be further reduced.

7.1.3 Increased Residential Density Strategies

The density increases presented in the two scenarios above can be achieved through a variety of strategies:

- subdividing smaller low density residential lots;
- increasing the proportion of multi-family residential to low density residential units in new neighbourhoods;
- encouraging higher density residential redevelopment in mature areas;
- increasing the maximum densities and building heights of the City's various multi-family residential districts in its Land Use Bylaw; or
- any combination of these strategies.

For the "MDP Average Residential Density Scenario", the strategies described above would be more modest than those necessary to achieve the "MDP Higher Residential Density Scenario".

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[25] Section 5.0 of *Growth Study 2009* indicates that "The average net density of all 12 neighbourhoods is 7 dwelling units per acre." This translates to 17.3 du/nrha.
[26] Section 4.2 of the MDP indicates "Average residential density is currently 18 dwelling units per hectare."
[27] Refer to Policy 8.1.1.2 of the MDP.

7.1.4 Recommended Residential Density Scenario

For the purpose of this *Growth Study*, it is recommended that the "MDP Average Residential Density Scenario" be utilized to calculate the City of Lloydminster's future residential land requirements over the next 30 years. This scenario represents a more conservative approach to increasing density in the event that the market is unable to achieve a more significant increase in density over the next 30 years, while concurrently introducing increased sustainable residential development. Should the City achieve a density of 21 du/nrha in new residential neighbourhoods in the short-term, the horizon of the residential land requirements under the "MDP Average Residential Density Scenario" will be extended beyond 30 years.

7.2 Non-Residential Density Scenarios

For the purpose of calculating future land requirements for forecasted non-residential development, this *Growth Study* considered two different non-residential density scenarios based on floor area ratio (FAR). FAR is a proportion of building area relative to the area of the site (or parcel) on which the building is located. For example, a two-storey building with a total building area of 200 ft² (or 100 ft² per floor) developed on a 1,000 ft² site has a floor area ratio of 0.2.

7.2.1 Constant Floor Area Ratio Scenario

This scenario assumes the City's current average FAR will remain constant. To calculate its current ratio, KCL Consulting Ltd. provided ISL and Nichols Applied Management with the City's assessment database (December 2012), which includes site area and building area figures for developed non-residential (commercial, industrial and institutional) parcels. An analysis of these figures determined that the City's average FAR is 0.2 and is therefore used for the purpose of this *Growth Study*. This FAR value is typical among medium-sized resource-based communities where there are minimal multi-storey commercial and industrial buildings, a significant amount of outdoor industrial storage developments (e.g., pipe laydown yards), vehicle-oriented local and regional commercial services (e.g., big box developments with vast amounts of parking), and limited transit-oriented development.

7.2.2 Increased Floor Area Ratio Scenario

The second scenario assumes an increased FAR of 0.25 or 25%. To achieve this scenario, non-residential development within Lloydminster would have to take on built forms that are different than traditional built forms. This could, for example, involve the development of a higher proportion of industrial uses where activities and storage occurs indoors rather than outdoors, and the development of multi-storey industrial and commercial office and service buildings. This could also involve increased municipal transit service to provide alternate modes of commuting to employment or commercial services, as well as introducing transit-oriented non-residential developments along transit corridors and at transit nodes, both of which would thereby reduce the amount of parking stall requirements at the development permit stage.

7.2.3 Recommended Non-Residential Density Scenario

For the purpose of this *Growth Study*, it is recommended that the "Constant Floor Area Ratio Scenario" be utilized to calculate the City of Lloydminster's future non-residential land requirements over the next 30 years. This scenario represents a conservative approach in the absence of municipal policy directing an increase or target range for non-residential density. It is reasonable to assume that the existing non-residential density scenario will remain constant, thereby functioning as a worst case scenario. Should the City begin experiencing increased non-residential density or adopt policy requiring such within the horizon of the *Growth Study*, the horizon of the non-residential land requirements under the "Constant Floor Area Ratio Scenario" will be extended beyond 30 years.

7.3 Municipal Assessment Split

Typically, urban municipalities strive to achieve financial sustainability by maintaining a minimum municipal assessment split of 20% non-residential property assessment compared to 80% residential property assessment. A review of City assessment data reveals that it has a healthy municipal assessment split of 35% non-residential to 65% residential. This split is partially attributed to:

- the presence of significant heavy industrial development within the City;
- a large amount of medium and light industrial development that supports the oil and gas industry in the area as well as other industries;
- the presence of significant institutions such as Lakeland College; and
- a significant amount of large-format big box commercial shopping centre developments that serve the City and the large surrounding region.

For the purpose of this *Growth Study*, it is assumed that Lloydminster's current municipal assessment split will be maintained over the duration of the medium-term to the 30-year time horizon of 2041.

7.4 Market Allowance

A 25% market allowance has been assumed for future land requirements among all land use types (residential, commercial, industrial and institutional and urban services). Ultimately there will be lands within both the City's current municipal limits and within the recommended future growth areas beyond the City in which the owners will not be motivated to participate in development prior to the 30-year medium-term horizon of 2041 for a variety of reasons. A market allowance assumption of 25% provides for flexibility to accommodate future growth and to encourage healthy competition among developers for the benefit of land consumers. If little or no market allowance is assumed in future growth requirement calculations, there is the potential that unmotivated landowners can deter developers and prospective industries, businesses and residents from choosing to develop or locate in Lloydminster due to increased costs to extend services or high land costs from motivated landowners or speculators attempting to capitalize on a reduced supply of available land in periods of high demand. The consequence of this is that interested developers and prospective industries, businesses and residents may choose to develop or locate within one of the City's rural neighbours or other urban municipalities that are proximate to the City.

7.5 Other Growth Assumptions

Additional assumptions for the purpose of this *Growth Study* include development setbacks from pipelines and wells, the retention of certain wetlands and previously developed lands that may be located within a future annexation area. It is assumed that 30% of land required for future growth will be undevelopable due to pipelines, wells, wetlands and previously developed lands.

7.5.1 Pipelines and Wells

As described in the associated *Environmental Inventory*, a series of development setback assumptions due to the presence of pipelines and wells has been established to determine undevelopable lands within undeveloped portions of the City and within the study area beyond the City. These assumptions include:

- 15 m right-of-way widths for pipelines;
- 100 m development setbacks from active wells or inactive wells that are not reclamation certified; and
- 35 m development setbacks from inactive wells that have been reclamation certified.

7.5.2 Wetlands

As described in the associated *Environmental Inventory*, numerous wetlands exist within the study area. The *Environmental Inventory* does not recommend which wetlands should be retained as this effort is typically reserved for a more detailed environmental investigation at the area structure plan preparation stage.

In absence of more detailed investigation, it has been assumed in consultation with City Administration that all Class IV and V wetlands within the study area that are 1.0 ha in size or greater will be claimed by the Crown or be retained by the City as environmental reserve and therefore not be considered part of the City's future gross developable land requirements. It is further assumed that none of these wetlands will be utilized for stormwater management purposes, with the exception of those identified for such in the *City of Lloydminster Storm Drainage Master Plan Update* (2009 report).

Ultimately, these assumptions will be reconsidered at future planning and development stages, particularly when more detailed environmental investigation is undertaken. At that time, it may be realized that some wetlands will not be claimed by the Crown and others will be removed in favour of compensation. Therefore, these assumptions for the purpose of this *Growth Study* shall not necessarily compel affected landowners to retain all wetlands that are 1.0 ha in size or greater, but rather form a conservation worst case scenario for the City for the potential protection of wetlands within the study area.

8.0 Future Land Requirements

As illustrated in Table 18, the total gross land area required to meet the City's 30-year growth needs is estimated at 26.6 quarter sections, based on the assumptions in Section 7.0 summarized as follows:

- the high population and employment growth scenarios;
- a residential density assumption of 19 du/nrha;
- a constant non-residential site coverage assumption of 20%;
- a constant municipal assessment split of 65% residential to 35% non-residential (commercial and industrial);
- a market allowance of 25% to encourage competition, land flexibility and land affordability and to recognize that some landowners will not be motivated to participate in development within the 30-year horizon; and
- an equivalent of 30% of the gross developable lands will be undevelopable due to wetlands (Class IV and V wetlands 1 ha or greater in size per the *Environmental Inventory*), assumed setbacks from pipelines and wells (also from the *Environmental Inventory*), and previously developed or fragmented lands.

Table 18: Future Land Requirements

Land Use	Total Future Land Required (ha)	Total Land Available Within City (ha)	Total Future Land Required Beyond City (ha)	Total Future Land Required Beyond City (quarters)[28]	Percent Total Future Land Required (%)
Low Density Residential	1,000.6	575.9	424.7	6.6	32.4%
Multi-Family Residential	160.9	82.0	78.9	1.2	6.0%
Commercial	338.4	54.0	284.3	4.4	21.7%
Industrial	692.9	455.3	237.6	3.7	18.1%
Institutional and Urban Services	162.6	0.0	162.6	2.5	12.4%
Airport Expansion	63.8	0.0	63.8	1.0	4.9%
Landfill Expansion	60.4	0.0	60.4	0.9	4.6%
Gross Developable Lands	**2,479.6**	**1,167.2**	**1,312.3**	**20.4**	**100.0%**
Undevelopable Lands	–	–	393.7	6.1	–
Gross Lands	**2,479.6**	**1,167.2**	**1,706.0**	**26.6**	–

8.1 Proposed Annexation Areas

Utilizing a rounded gross total land requirement of 27 quarter sections, the City of Lloydminster has identified six proposed annexation areas, as illustrated in Map 7, to accommodate its estimated 30-year growth future land requirements. These six areas are as follows (Sections 8.1.1 through 8.1.6 provide more information on each area).

1. The South Annexation Area comprises slightly more than ten quarter sections north of the future Highway 16 bypass, between 40 Avenue to the east and 75 Avenue to the west, including eight within the County of Vermilion River and slightly more than two within the RM of Wilton No. 472.

[28] Assumes 64.25 ha per quarter section due to past widenings of adjacent rural road allowances.

2. The West Annexation Area comprises four quarter sections within the County on either side of Highway 16.

3. The Northwest Annexation Area comprises three quarter sections within the County west of 75 Avenue south of the airport.

4. The Airport Expansion Annexation Area comprises one quarter section within the County west of the airport.

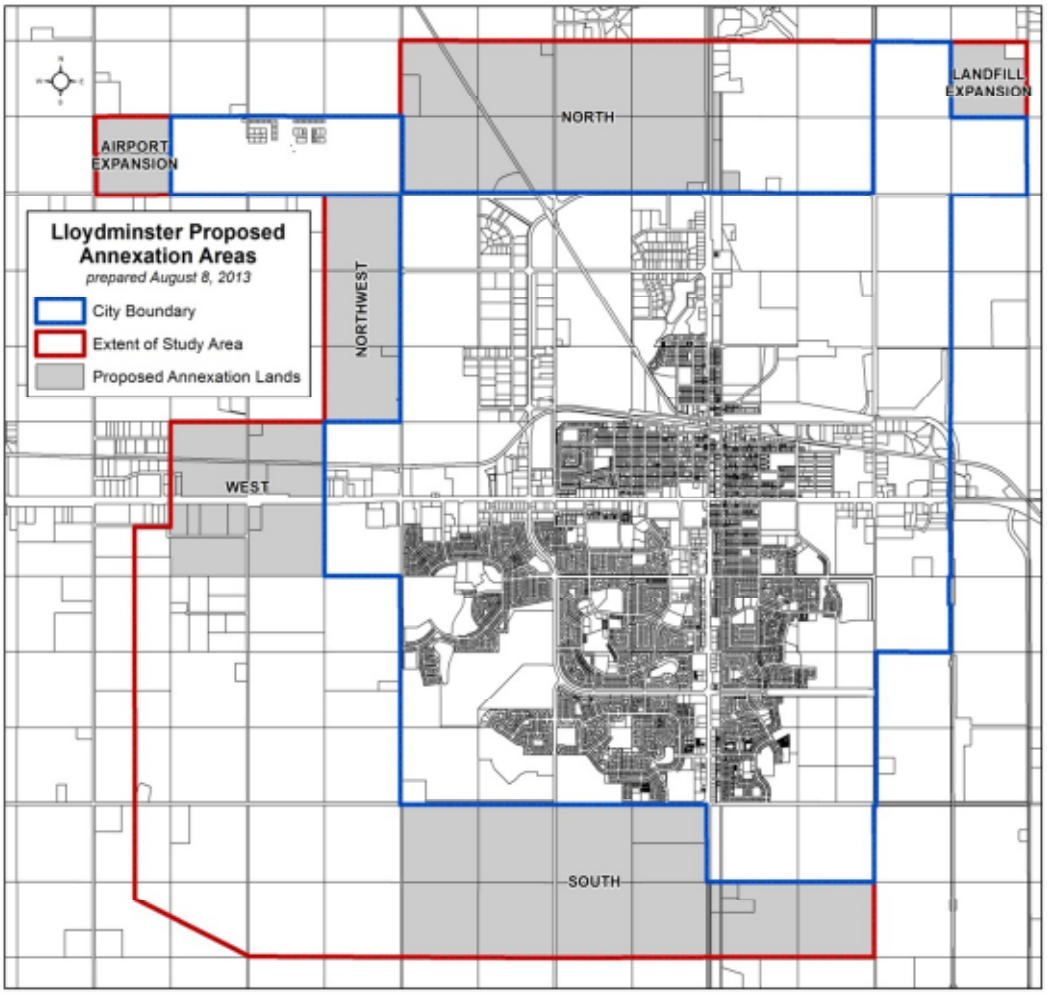
5. The North Annexation Area comprises an additional eight quarter sections within the County north of 67 Street, between 75 Avenue to the west and Highway 17 to the east, and a sliver of lineal frontage along the east side of Highway 17 within the RM of Britannia No. 502.

6. The Landfill Expansion Annexation Area comprises nearly one quarter section within the RM of Britannia No. 502 to the northeast of the City's current landfill facility.

The six proposed annexation areas amount to a total of 1,749.3 ha of gross titled area, which translates to 27.2 quarter sections.[29] This amount of gross titled area is sufficient to accommodate the City's estimated 30-year growth future land requirements of 1,706.0 ha or 26.6 quarter sections, as presented in Table 18 above.

[29] Assumes 64.25 ha per quarter section due to past widenings of adjacent rural road allowances.

Map 7: Proposed Annexation Areas



8.1.2 South Annexation Area

The South Annexation Area (~665.3 ha) comprises:

- eight quarter sections within the County of Vermilion River (~514.6 ha) bounded by 75 Avenue to the west, 12 Street to the north, Highway 17 to the east and the future Highway 16 bypass to the south, which are identified as an Urban Expansion Area in the IDP;
- approximately 1,600 m of the adjacent 75 Avenue road allowance to the west (~3.3 ha);
- approximately 1,600 m of the 59 Avenue road allowance that bisects the eight quarter sections (~4.9 ha);
- approximately 800 m of the adjacent Alberta portion of Highway 17 to the east (~1.0 ha); and
- approximately 2.2 quarter sections within the RM of Wilton No. 472 (~141.6 ha), inclusive of road right-of-way, bounded by the Alberta portion of Highway 17 to the west, the future Highway 16 bypass to the south, 40 Avenue to the east and those lands that the City annexed in 2010 to the north.

This area represents a logical residential extension of the City to the south up to the future Highway 16 bypass, which is anticipated to be in place within the horizon of the *Growth Study*. It also provides the opportunity to develop highway-oriented and large format commercial uses along Highway 17, the City's

future primary entrance once the bypass is built, as well as along the bypass corridor between the future Highway 17 interchange and the planned 12 Street interchange to the west. These commercial opportunities, as well as neighbourhood commercial opportunities nestled within the residential expansion lands, will contribute to sustaining the City's municipal assessment split. Though this area is encumbered by some wetlands and buffers associated with wells and pipelines, these encumbrances are less frequent compared to lands west of 75 Avenue and north of 12 Street (Township Road 494) to the northwest.

From a servicing perspective, these lands may make use of stormwater conveyance along the future bypass once it is built. Also, the vast majority of these lands are within the City's central water pressure zone, minimizing the need for booster stations and a new reservoir over the next 30 years. Though the majority of subject lands within the RM of Wilton No. 472 require a lift station for sanitary servicing, the costs for building this infrastructure will be borne by the developer at the subdivision stage, and the lift station could be designed to accommodate long-term expansion to the east. This affords a greater catchment for the future lift station, allowing greater return on investment for this inevitable infrastructure investment. Prior to development of these lands, extension of the South Sanitary Trunk to the area will be necessary, and will occur as part of development provided no leapfrogging occurs. Twinning of the East Sanitary Trunk and outfall to the wastewater treatment plant (WWTP) is also required to service these lands.

In terms of transportation, serviceability is least constrained along Highway 17 as the City will gain jurisdiction and control over its function upon annexation. Though at present those lands to the west and east become increasingly constrained from a transportation perspective, these constraints will be diminished during the medium term if the transportation network is logically extended in a radial fashion from Highway 17 over the 30-year timeframe as development advances.

8.1.3 West Annexation Area

The West Annexation Area (~265.1 ha) comprises:

- four quarter sections (~241.4 ha) immediately west of the City — two on either side of Highway 16 — that are identified as an Urban Expansion Area in the IDP; and
- road allowances (~23.7 ha) for Highway 16, Range Road 13 and local internal roadways (Auto Road and Spruce Hill Road) on either side of Highway 16.

This area represents a logical non-residential extension of the City to the west. It provides an immediate opportunity to develop highway-oriented and large format commercial uses along Highway 16 to meet the majority of City's short-term commercial needs prior to the bypass being constructed. This area also affords the opportunity to develop industrial uses in close proximity to Highway 16 both to the north and south of the highway commercial corridor, and to the Canadian National (CN) rail line that bisects the two northern quarter sections. The area also features nine fragmented parcels of which the majority are previously developed with industrial uses that can be readily integrated into Lloydminster's advancing urban fabric. Overall, this area is conducive to commercial and industrial opportunities due its highway visibility, access to multiple modes of transport, and compatibility with existing non-residential uses within the area. The area will furthermore contribute to sustaining the City's current municipal assessment split.

These four quarter sections are among the least constrained non-residential lands for transportation and stormwater serviceability, although improvements to the Northwest Drainage Channel are required to support development in this area as well as elsewhere in the City. In terms of water, all lands, except the southern half of the southwest quarter section (NE-33-49-1-W4), are within City's central water pressure zone, minimizing the need for booster stations and a new reservoir over the next 30 years. In terms of wastewater, all lands can be drained using gravity sewers. However, upgrades to the downstream wastewater collection system will be required for servicing these lands, including completion of the West Sanitary Trunk, and possible twinning of a portion of the North Sanitary Trunk and WWTP Outfall, depending on development elsewhere in the City.

8.1.4 Northwest Annexation Area

The Northwest Annexation Area (~193.2 ha) comprises three quarter sections immediately west of 75 Avenue and south of 67 Street. This area, which abuts the current City limits to the north, east and south, are identified as an Urban Expansion Area in the IDP. The adjacent 75 Avenue and 67 Street are both already within the City's jurisdiction and control.

Like the West Annexation Area, this area represents a logical non-residential extension of the City to the west. It provides a medium-term opportunity to develop industrial uses west of 75 Avenue, which would be compatible with the planned industrial development across 75 Avenue to the east and adjacent lands to the south. Industrial development within this area is also in close proximity to the airport, which is across 67 Street to the north, and the CN rail line and Highway 16, which are within 450 m and 750 m respectively to the south. Overall, this area is conducive to industrial opportunities due its proximity and access to multiple modes of transport (air, rail and highway), and compatible with the industrial development advancing from the east. The area will furthermore contribute to sustaining the City's current municipal assessment split.

These three quarter sections are serviceable in the medium-term of the 30-year timeframe in terms all infrastructure servicing — stormwater, wastewater, water and transportation. All lands in this area are within City's central water pressure zone and can tie into the City's wastewater network using gravity sewers. However, twinning of a portion of the North Sanitary Trunk/WWTP outfall and completion of the West Sanitary Trunk may be required to service portions of this area.

8.1.5 Airport Expansion Annexation Area

The airport expansion annexation area (~66.2 ha) comprises the quarter section immediately west of the airport (~63.8 ha) and approximately 800 m of the adjacent road allowance to the south (~2.4 ha). The quarter section, identified as Airport Protection in the IDP, is divided into two land titles. The southern half of the quarter section is owned by the City of Lloydminster (~33.3 ha), while the northern half is privately owned (~30.5 ha).

The City proposes to annex this quarter section in accordance with IDP Policy 4.7.c) as it is adjacent to its current City limits and the majority of it is City-owned. This area will accommodate future extension of the runway on the City-owned southern half of the quarter section, and will allow for the future development of airport-related land uses on the northern half.

8.1.6 North Annexation Area

The North Annexation Area (~543.0 ha) comprises:

- eight quarter sections within the County of Vermilion River (~510.4 ha) bounded by 75 Avenue to the west, 67 Street to the south and Highway 17 to the east, which are identified as an Urban Expansion Area in the IDP;
- road allowances (~8.9 ha) for the Alberta portion of Highway 17, 59 Avenue (Range Road 11), 75 Avenue (Range Road 12) and some road widening of 67 Street; and
- approximately 23.7 ha within the RM of Britannia No. 502, inclusive of road right-of-way, east of the Alberta portion of Highway 17 and north of 67 Avenue.

This area represents a logical extension of the City to the north. It provides the opportunity to develop a sizeable new residential community on the north side of the City in close proximity to the City's major employment areas. This new community will help minimize the amount of long-term commuter flow traffic from the City's south side to employment on the City's north side, thereby reducing fuel consumption and lessening the severity of the City's current population-employment divide. It and the other existing and future residential communities within the City's north side will create a population catchment to sustain the

north side's own schools, recreation facilities, etc., and will also strengthen the City's downtown core by better balancing the distribution of population around its central core.

This area will also provide opportunities for highway-oriented and service commercial uses along Highway 17. A smaller-scale commercial corridor along 67 Avenue could also provide retail and neighbourhood commercial opportunities to serve the new residential community to the north. Finally, the quarter section within this area immediately east of the airport, encumbered by noise exposure forecast contours and greater height restrictions, will provide further industrial development opportunities adjacent to existing and future industrial development to the southeast, south and southwest. Therefore, the North Annexation Area's commercial and industrial development opportunities will also contribute to sustaining the City's municipal assessment split.

This area is serviceable over the short to medium-term for stormwater, wastewater and water. In terms of water, all lands in this area, except those lands east of Highway 17, are within City's central water pressure zone. Depending on ground contours, local pressure reduction valves may be required for the land east of Highway 17, which is located in the east water pressure zone. In terms of wastewater, all lands can be drained using gravity sewers. However, twinning of the North Trunk and WWTP outfall may be required depending on development elsewhere in the City. A connection to the North Sanitary Trunk can be made near Highway 17, rather than the 40 Avenue connection proposed in the 2009 Sanitary Sewer Master Plan. Like the South Expansion Area, transportation serviceability is least constrained along Highway 17 as the City will gain jurisdiction and control over its function upon annexation. Though at present those lands to the west become increasingly constrained from a transportation perspective, these constraints will be diminished during the medium-term if the transportation network is logically extended westward from Highway 17 and northward from 67 Avenue as development advances.

Though the amount of wetland and oil and gas buffer encumbrances within this area is somewhat similar in fashion as lands to the southwest of the City, this area was identified for annexation within the 30-year timeframe as, among other things:

- this area's encumbrances are on the outer edges and less concentrated, whereas the southwest area's encumbrances are in a high concentration immediately adjacent to the current City limits;
- development within this area could occur in a logical and efficient contiguous fashion, whereas development of the southwest area would require more costly and inefficient leapfrogging;
- this area is within the City's central and east water pressure zones, and as such will not require any booster stations (local pressure reducing valves may be required for the land east of Highway 17), whereas the majority of the southwest area is within the west pressure zone that would require costly water infrastructure such as a new reservoir and pumphouse or booster stations;
- directing all future residential growth to the south side of Highway 16 would further exacerbate the population-employment divide within the City resulting in increased levels of traffic congestion earlier than necessary and lengthening commute times and distances; and
- directing all future residential growth to the south side of Highway 16 would make the future residential community in the northeast portion of the City (near the golf course) less likely to sustain its own schools, recreation facilities, commercial services, etc.

8.1.7 Landfill Expansion Annexation Area

The landfill expansion annexation area (~60.4 ha) comprises the majority of the quarter section to the northeast of the City's existing landfill facility. The northeast corner of the quarter section is excluded as it is privately owned and spans the quarter section line to the north.

The City proposes to annex these lands as they are City-owned and adjacent to its current City limits. The City intends for these lands to accommodate long-term expansion of its landfill facility.

8.2 Preliminary Land Use Breakdown

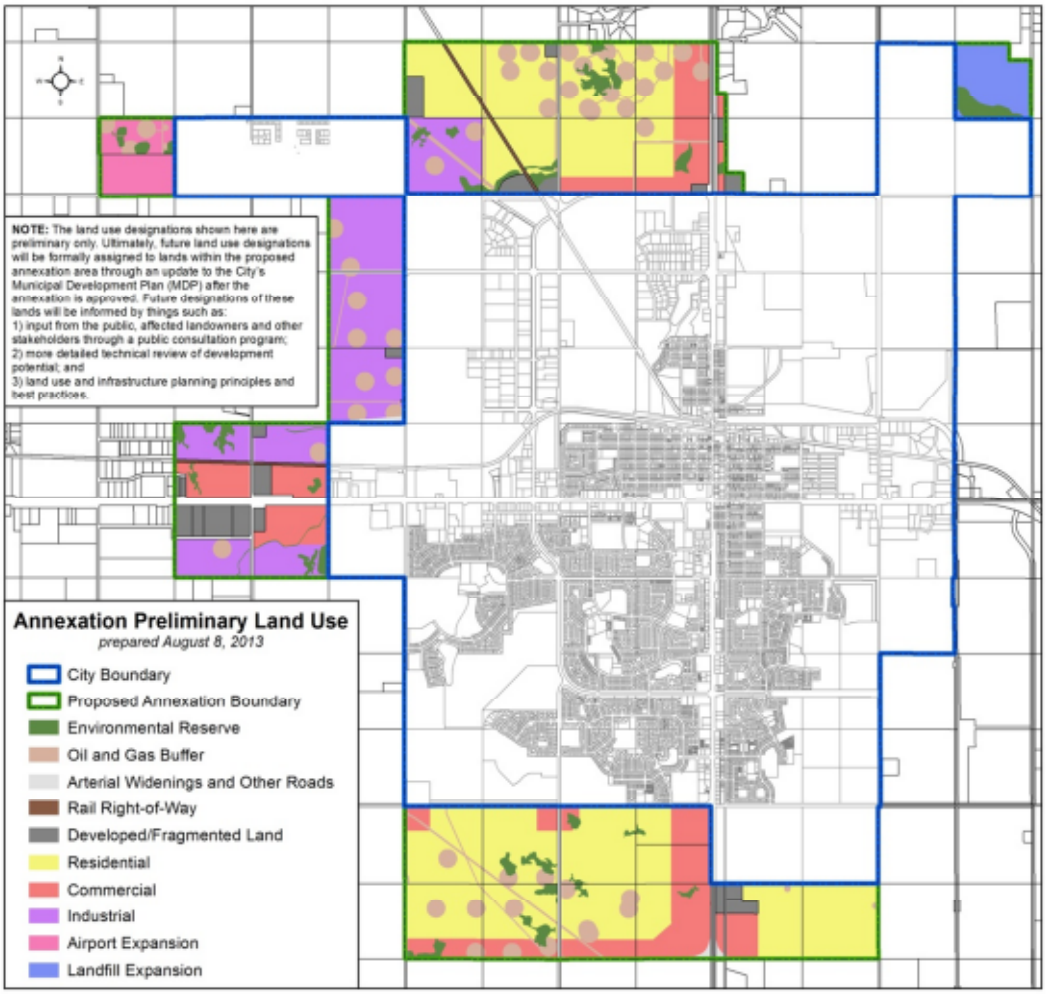
A preliminary land use breakdown for the recommended growth areas is illustrated in Map 8. Table 19 summarizes the initial gross deductions and then the preliminary land use breakdowns within these areas, resulting in a gross developable area of 1,360.7 ha or 21.2 quarter sections.[30] This amount of gross developable area is sufficient to accommodate the City's estimated 30-year growth gross developable land requirements of 1,312.3 ha or 20.4 quarter sections, as presented in Table 18 above.

Table 19: Recommended Growth Areas Preliminary Land Use Breakdown

Land Use	Area (ha)
Gross Area	**1,793.2**
Less Existing Road Allowances (Alberta only)	43.9
Gross Titled Area	**1,749.3**
Less Other Roads	3.7
Less Arterial Road Widening	50.2
Less Rail Right-of-Way	10.5
Less Environmental Reserve	79.0
Less Oil and Gas Buffers	166.0
Less Previously Developed/Fragmented Lands	79.1
Gross Developable Area	**1,360.7**
Residential[31]	674.7
Commercial	286.0
Industrial[32]	303.2
Airport Expansion	48.6
Landfill Expansion	48.2

[30] Assumes 64.25 ha per quarter section due to past widenings of adjacent rural road allowances.
[31] Of the 162.6 ha of Institutional and Urban Services land requirements illustrated in Table 17, 75% has been allotted to Residential while 25% has been allotted to Industrial.

Map 8: Preliminary Land Uses within Annexation Area



This preliminary land use breakdown illustrated in Map 8 was partially informed by, and is generally consistent with, the future residential and non-residential land use designations presented within the *County of Vermilion River and City of Lloydminster Intermunicipal Development Plan* (IDP). Compared to the IDP, there are some future land use fluctuations: along the Highway 16 bypass west of Highway 17; within the southern halves of the two quarter sections south of Highway 16 to the west of the City; and within portions of four quarter sections north of 67 Street. The preliminary land use breakdown was also informed by the opportunities and constraints analysis and good land use planning principles with input from the City's planning staff and consultants.

The preliminary land uses are not intended to be binding. Ultimately, actual land uses will be assigned to the proposed annexation area after the Provinces render their decisions on the annexation applications through an update to the City's MDP. The future designations of these lands through the MDP update will be informed by more detailed technical review of their development potential, good land use planning principles, and input from the public, affected landowners and other stakeholders. This process will also afford the opportunity to concurrently amend the IDP to address any land use fluctuations if necessary.

9.0 Summary and Conclusions

9.1 Historic Population Growth Summary

1. Between 1961 and 2011, the City of Lloydminster's population has increased an average of 3.2% annually.

2. Between 1971 and 2011, the City's population tripled from 8,691 in 1971 to 27,804 in 2011.

3. The City's population grew by 15.7% between 2006 and 2011, which equals an average annual growth rate of 3.0%.

4. The 2011 federal census ranked Lloydminster among the ten fastest growth census agglomerations in Canada between 2006 and 2011. Its five-year growth rate over this period was 14.0%.

5. With the exception of one period, the City of Lloydminster experienced moderate to high population growth during each five-year period over the past 50 years since 1961.

6. Among the various federal censuses between 1961 and 2011, excluding the five-year period between 1986 and 1991, the City's average annual growth rate has varied between 1.9% and 7.8%.

7. At its 2013 population of 31,483, the City has doubled its population over the past 32 years since recording a population of 15,031 in the 1981 federal census.

8. Lloydminster's historical population growth pattern is reflective of its: significant role in the oil and gas industry; role as a regional service centre for eastern Alberta and western Saskatchewan; equidistance along the Yellowhead Highway between Edmonton and Saskatoon; and quality of life and smaller city atmosphere that makes it attractive to young families.

9.2 Demographic Analysis Summary

1. The City of Lloydminster has two significant population bubbles — the cohorts encompassing ages 20 through 34 and the 0 to 4 age cohort — and the City's age distribution is more similar to Alberta's than Saskatchewan's.

2. An analysis of the City's net migration between 2001 and 2011 reveals that people in their late teens through mid-forties have migrated to Lloydminster in significant numbers over the past 10 years, with pre-school and school-aged children associated with those in their twenties through forties. People in their retirement age are also migrating to Lloydminster.

3. A comparable municipality analysis revealed that Grande Prairie was most similar city to Lloydminster in terms of current demographics and historic population growth.

9.3 Growth Forecast Scenarios Summary

1. Low, medium and high 30-year growth forecast scenarios were developed for the *Growth Study* with 2011 as the baseline and 2041 as the horizon.

2. The Low Scenario, which has an average annual growth rate of 1.5%, forecasts a population of 44,053 residents, 19,381 housing units and 26,726 jobs by 2041. This results in an overall 58% population increase over the 30 years.

3. The Medium Scenario, which has an average annual growth rate of 2.1%, forecasts a population of 51,307 residents, 22,623 housing units and 31,508 jobs by 2041. This results in an overall 85% population increase over the 30 years.

4. The High Scenario, which has an average annual growth rate of 2.5%, forecasts a population of 58,983 residents, 26,059 housing units and 36,567 jobs by 2041. This results in an overall 112% population increase over the 30 years.

5. The *Growth Study* utilizes the High Scenario as its 30-year growth forecast scenario as it reflects the very real possibility of greater than expected population growth and represents the worst case scenario in calculating future land requirements.

6. The High Scenario is also reasonable as its average annual growth rate of 2.5% is less than the 2.8% average annual growth rate experienced by Grande Prairie since it was slightly smaller than Lloydminster in 1981.

7. The reasonableness of the High Scenario is reinforced by Lloydminster's 2013 municipal census that occurred while this *Growth Study* was being prepared. The census resulted in a population of 31,483, which represents an average annual growth of 6.4% since the 2011 federal census. This average annual growth rate is significantly higher than the High Scenario's 2.5% average annual growth rate.

9.4 Land Absorption and Land Supply Summary

1. Between 2003 and 2012, the City has experienced an average absorption of 67.8 ha (1.1 quarter sections) of land per year in subdivision registrations. With 1,339.1 ha of unabsorbed lands available for subdivision, it will take 19 years to absorb these lands through subdivision registration if this annual absorption rate were to remain constant and land use among the available lands was flexible.

2. The City of Lloydminster presently has 635.1 ha of gross residential land supply available for future subdivision, the majority of which is located within the Saskatchewan portion of the City.

3. The City's available residential land supply can accommodate 19,113 residents resulting in a build-out population of 46,917 within the current City limits. It is estimated that this land supply would be absorbed in approximately 20 years. Based on recent land absorption rates by province however, the available residential land supply within Alberta will be consumed within 9 years.

4. It is prudent that annexation be initiated to maintain a 30-year residential land supply on both sides of the City.

5. The City has effectively depleted its supply of commercial lands. The City has a two-year supply of gross commercial land (54.0 ha) available for subdivision.

6. The City also has a five-year supply of gross industrial land (455.3 ha) available for subdivision.

7. It is not good planning practice for an urban municipality to have five years or less of land supply available for commercial and industrial growth. It is prudent that annexation be initiated to maintain a 30-year supply of commercial and industrial lands.

8. The City's current municipal assessment split is 65% residential to 35% non-residential. It is the City's desire to maintain this split.

9. The inability of the City to develop non-residential lands in the short-term will seriously impact its ability to maintain this municipal assessment split.

9.5 Land Requirements and Annexation Area Summary

1. An annexation area comprising 27 quarter sections has been determined that is sufficient to accommodate Lloydminster's residential, commercial, industrial and institutional and urban services growth by 2041 under the High Scenario, as well as future expansion of the City's airport and landfill facilities. This includes an allowance for market attractiveness and competition among landowners and to recognize that some landowners within the annexation area may not participate in urban development within this time period.

2. After deducting previously developed and fragmented lands and undevelopable lands, such as arterial road widening, rail right-of-way, environmental reserve, oil and gas well and pipeline buffers, the 27 quarter sections provide approximately 1,360.7 ha of gross developable lands to accommodate the approximate 1,312.3 ha of land required to accommodate the City's future growth to 2041.

3. The proposed annexation includes slightly more than 10 quarter sections to the south bounded by 75 Avenue to the west, the future Highway 16 bypass to the south and 40 Avenue to the east. The preliminary land uses applied to this area include a southward extension of residential from the north with commercial opportunities primarily along Highway 17 and the future Highway 16 bypass.

4. The proposed annexation also includes 4 quarter sections to the west and 3 to the northwest along Highway 16 and 75 Avenue respectively. The preliminary land uses applied to these areas are commercial on either side of the Highway 16 corridor and industrial on the balance of the lands.

5. The proposed annexation also includes 8 quarter sections to the north bounded by 75 Avenue to the west, 67 Street to the south and Highway 17 to the north and some additional lands along the east side of Highway 17. The preliminary land uses applied to this area include residential on the majority of lands with commercial opportunities primarily along Highway 17 and 67 Street and industrial directly east of the airport.

6. Combined, the above annexation areas to the south, west, northwest and north represent logical and efficient extensions of the existing urban footprint and servicing.

7. The proposed annexation also includes a full quarter section west of the airport and nearly a full quarter section northeast of the landfill. The quarter section west of the airport, the majority of which is City-owned, will enable the planned extension of the airport runway and development of associated airport-related uses. The quarter section northeast of the landfill, which is City-owned, will enable the long-term expansion of the landfill facility.

8. Lands to the southwest of the current City limits are not subject to the proposed annexation as those lands immediately adjacent to the current City limits are significantly encumbered by oil and gas facilities

and wetlands and therefore significantly undevelopable. Future development to the southwest would therefore have to leapfrog, resulting in inefficient and costly infrastructure extensions and service provision.

9. Further to the immediately adjacent encumbrances, the vast majority of these lands are within a different water pressure zone that would require more costly water infrastructure investments to service compared to other growth directions (e.g., a new pumphouse and reservoir or booster stations).

10. Introducing a new residential community to the north rather than expanding to the southwest to accommodate future residential growth will prevent exacerbating the population-employment divide within the City. Expanding to the southwest rather than the north would result in increased levels of traffic congestion earlier than necessary and lengthened commute times and distances.

11. The annexation area to the north provides for future residential development closer to Lloydminster's existing and future employment areas resulting in less fuel consumed through commuting and a more balanced population-employment divide within the City.

12. The annexation area to the north will also: increase the viability of other existing and future residential communities within the City's north side (near the golf course) by creating a larger population catchment to sustain community facilities for the north side; and strengthen the downtown by better balancing the distribution of the City's population around its central core.

13. All annexation areas are accessible by the existing and future transportation network and are serviceable for stormwater and water. The majority of the annexation area is serviceable by gravity.

9.6 Conclusions

1. It is prudent that the City of Lloydminster proceed with annexation now to obtain a residential land supply sufficient to accommodate 30 years of growth in both the Alberta and Saskatchewan portions of the City that will provide for sufficient market attractiveness and competition.

2. It is prudent that the City of Lloydminster proceed with annexation now to allow for future commercial and business park expansion in the short-term to sustain its municipal assessment split of 65% residential to 35% non-residential and therefore its current fiscal sustainability.

3. Overall, a 30-year annexation based on land requirements generated by the High Scenario (2.5% average annual growth rate) is appropriate as Lloydminster is one of the fastest growing municipalities in Alberta and its major growth factors — its significant role in the oil and gas industry, its role as a regional service centre and its central location along a major transportation corridor — will continue to spur growth.

ISL Engineering and Land Services

Inspiring sustainable thinking

City of Lloydminster

Final Report

Servicing Assessment

August 2013

ISL Engineering and Land Services

ISL Engineering and Land Services Ltd. is an award-winning full-service consulting firm dedicated to working with all levels of government and the private sector to deliver planning and design solutions for transportation, water, land, and environmental projects.

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Disclaimer

The information presented in this Servicing Assessment is for annexation purposes only and is not intended to alter market conditions. Developers, landowners and prospective landowners are responsible for undertaking their own due diligence.

1.0 Introduction

This report, entitled "City of Lloydminster Servicing Assessment," is being prepared in conjunction with the "City of Lloydminster Growth Study" and the "City of Lloydminster Environmental Inventory of Potential Expansion Lands West of Lloydminster, AB/SK," all three of which comprise the "City of Lloydminster Comprehensive Growth Study". The purpose of the Servicing Assessment is to identify long-term infrastructure network requirements for the Study Area in support of the City's Growth Study. The scope includes the preparation of generalized servicing concepts for transportation, stormwater management, wastewater, and water servicing, and determination of the optimal lands for expansion based on servicing constraints and upgrading needs.

1.1 Study Area

The Study Area encompasses approximately 3,472 hectares of land that currently resides in either the County of Vermilion River (AB), the Rural Municipality of Britannia No. 502 (SK), the Rural Municipality of Wilton No. 472 (SK) or the current City of Lloydminster city limits. It consists of seven blocks of land as illustrated on Figure 1.1. For the purpose of this study, the area is broken down as follows:

- The North Urban Expansion Area (North UEA) consists of one large block of land totalling approximately 896 gross hectares (14 quarter sections) extending north and northwest from the City boundary. For the purpose of this Servicing Assessment, this area is subdivided into north and west portions (see Figure 1.1). Three of the quarter sections in the west portion are located within the current City boundary. The Growth Study indicates that the future land use within the North UEA will be predominately non-residential with some residential to the far north.
- The Northeast Area is immediately east of the North UEA, and is located north of the Saskatchewan side of the City. It is made up of 4 quarter sections (256 gross hectares), and it is anticipated to have residential and open space land uses (landfill buffer) in the future, with some non-residential uses adjacent to Highway 17.
- The Northeast (Landfill) Area is a single quarter section (64 gross hectares) located adjacent to the northeast corner of the City on the Saskatchewan side. It is expected to be used for landfill expansion (public utility) in the future, and as such, servicing to this quarter section has not been assessed. It is observed, however, that stormwater management, sanitary and water servicing (if necessary) would not be an issue due to the proximity of the area to the wastewater treatment facility, water treatment plant, and Neale Lake.
- The West of Airport Area comprises a single quarter section (64 gross hectares) directly west of the airport, and northwest of the City. The future land use for the southern half will be airstrip extension, while it is anticipated the northern half will be for airport-related or used for other non-residential use.
- The Central Urban Expansion Area (Central UEA) consists of 1,186 gross hectares (approximately 18.5 quarters-sections) and is situated along the current west boundary of the City. Approximately three quarter sections are situated within the current City boundary. The future land use will be primarily residential, with non-residential north and immediately south of Highway 16, and in the southwest corner.
- The South Urban Expansion Area (South UEA) is made up of approximately 13.5 quarters sections (878 gross hectares), all outside of the current City boundary. It extends south from the City boundary on the Alberta side, as well as south of the Central UEA, to the future bypass. The future land use is expected to be residential, with the exception of a small area adjacent to Highway 17, which is expected to be non-residential.
- The Southeast Area is comprised of 2 quarter sections (128 gross hectares) located south of the City on the Saskatchewan side. The Growth Study indicates that it may have residential land uses in the future, with the exception of a small amount of non-residential land use adjacent to Highway 17.

ALBERTA

SASKATCHEWAN

HIGHWAY 17

NORTH URBAN EXPANSION AREA (NORTH PORTION)

NORTHEAST

NORTHEAST (LANDFILL)

WEST OF AIRPORT AREA

NORTH URBAN EXPANSION AREA (WEST PORTION)

67 STREET

62 STREET

NEALE LAKE

CANADIAN NATIONAL RAILWAY

HIGHWAY 16

44th STREET

44 STREET

75 AVENUE

RANGE ROAD 14

CENTRAL URBAN EXPANSION AREA

RANGE ROAD 13

50 AVENUE (HIGHWAY 17)

45 AVENUE

12 STREET

SOUTH URBAN EXPANSION AREA

62 AVENUE

SOUTHEAST

ALBERTA

HIGHWAY 17

SASKATCHEWAN

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LLOYDMINSTER Canada's Border City

City of Lloydminster

Servicing Assessment

Study Area

Legend

City Boundary

Study Area

1:50 000 0 500 1000 1500m

Figure 1.1

13631

August, 2013

The proposed land uses are shown on Figure 1.2. A more detailed breakdown of the non-residential land uses is provided in the Growth Study; these are generally consistent with the current City of Lloydminster / County of Vermilion River Intermunicipal Development Plan (IDP) and the previous Growth Study (2009) undertaken by the City.

1.2 Utility Master Plans

The City of Lloydminster Storm Drainage, Sanitary Sewer and Water Distribution Master Plans were last updated by Associated Engineering in 2009. This study relies on these Master Plans and their technical recommendations for existing system upgrades and future servicing strategies, to the extent that they remain applicable. Generally, the future land uses assumed in the Master Plans follow the IDP, and as such are also consistent with the Growth Study. Population densities assumed in the Master Plans are slightly higher than in the Growth Study (a difference of perhaps 5 people/ha, depending on assumptions), which means that the Master Plans are somewhat conservative but still applicable to the current Servicing Assessment.

The conservative nature of the Master Plans is beneficial as it allows some additional system capacity to accommodate (potentially) rapid development while necessary upgrades are being designed and constructed. The capacity of the existing utility systems will need to be periodically reviewed as development progresses to refine estimates as to the timing of necessary upgrades.

1.3 Transportation Master Plan

The City of Lloydminster Transportation Master Plan was last updated in 2010. The study was completed for three population scenarios: short (30,000), medium (35,000) and ultimate (100,000) population scenarios. The ultimate population scenario (100,000) includes full build-out within the current City boundaries and the future urban expansion areas prescribed by the IDP. The TMP identifies arterial and collector roadway networks required to service these future lands at full build-out. For this Servicing Assessment, the arterial and collector road networks from the TMP's ultimate population scenario were adopted. It should be noted that both of these networks are subject to change based on the next update of the TMP.

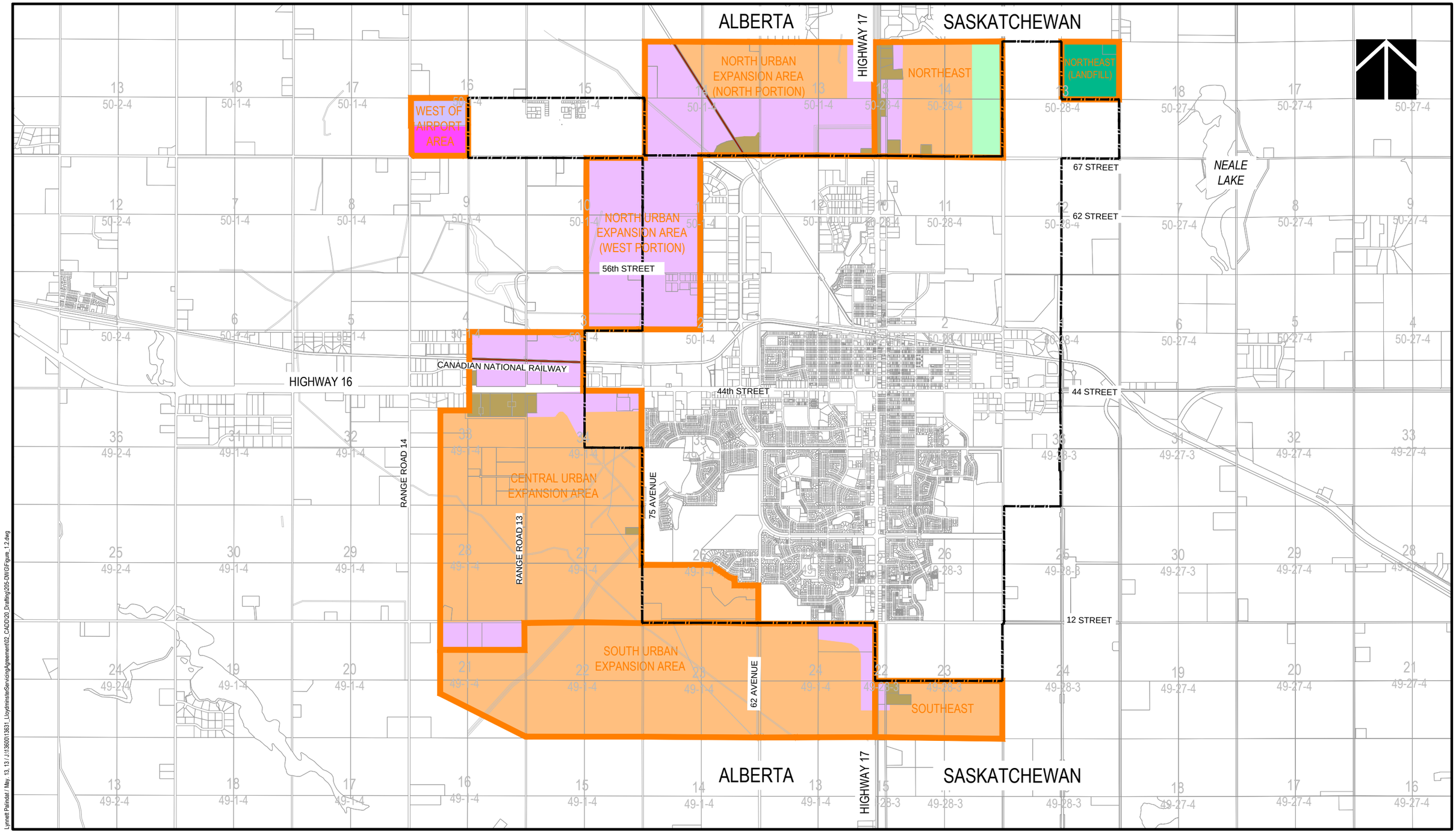
Table 2.1 Utility Serviceability Coding Criteria

Rank	Description	Adjacent to Serviced Existing Development?	Servicing Requires:	
			Existing System Upgrades?	Offsite Infrastructure?
1	Immediate servicing possible, no existing system upgrades required	✓		
2	Immediate servicing possible, minor existing system upgrades required	✓	✓	
3	Servicing possible once adjacent quarter-sections are serviced, minor (or no) existing system upgrades and/or offsite infrastructure required (likely already completed to enable servicing of the adjacent area)		~	~
4	Servicing possible once adjacent quarter-sections are serviced, substantial offsite infrastructure or existing system upgrades required in advance (to be completed as part of servicing of the adjacent/downstream areas)		✓	✓
5	Long-term development potential; Major existing system upgrades required before servicing / major constraints	~	✓	✓

Note:

~ Denotes "possibly" or "may or may not be required depending on the area or other factors"

✓ Denotes "yes" or "required for the area"



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ISL Engineering and Land Services

LLOYDMINSTER Canada's Border City

City of Lloydminster

Servicing Assessment
Study Area With Tentative Future Land Uses

Legend

- City Boundary
- Study Area
- Developed
- Future Residential
- Future Non-Residential
- Future Open Space (Landfill Buffer)
- Future Public Utility (Landfill Expansion)
- Future Airport
- Unknown
- Railway

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Figure 1.2

13631

August, 2013

2.0 Utility Serviceability Summary

It can be concluded that water, wastewater and storm drainage servicing can be provided to all portions of the study area. However, the cost of servicing any particular quarter section can vary as servicing of a quarter section may or may not require off-site costs including:

- upgrades to existing municipal infrastructure, and/or
- new infrastructure to connect the quarter section to the existing municipal system.

For purposes of summarizing the ease to which any given quarter section can be provided municipal servicing, a coding system was developed. The coding system summarizes the serviceability of each quarter section in the Study Area with respect to stormwater management (Section 3.0), wastewater collection (Section 4.0) and water servicing (Section 5.0). It ranks the serviceability of each quarter section by utility from 1 (short-term development potential; readily serviceable) to 5 (long-term development potential; major constraints), and then an overall serviceability factor (range 3 to 15) is generated by adding each component score. Specifically, the coding criteria described in Table 2.1 are employed for each utility.

Figure 2.1 illustrates the preferred lands for development with respect to utility servicing, based on the overall serviceability factors. The green shaded lands are most readily serviceable, followed by the orange shaded lands. The pink shaded lands are still serviceable, but will incur the greatest costs to do so.

Detailed discussion of the storm, sanitary and water servicing requirements for each area are presented in the following sections. Individual serviceability figures for each utility (storm, sanitary and water) are also included.

4 or 12 (DEPENDING ON EXTENT OF SERVICING REQUIRED)

WEST OF AIRPORT AREA

NORTH URBAN EXPANSION AREA (NORTH PORTION)

NORTH URBAN EXPANSION AREA (WEST PORTION)

CENTRAL URBAN EXPANSION AREA

SOUTH URBAN EXPANSION AREA

NORTHEAST

NORTHEAST (LANDFILL)

SOUTHEAST

ALBERTA

SASKATCHEWAN

Water Pressure Zone 1 (Central)

Water Pressure Zone 2 (West)

Water Pressure Zone 3 (East)

HIGHWAY 16

HIGHWAY 17

CANADIAN NATIONAL RAILWAY

56th STREET

44th STREET

67 STREET

62 STREET

44 STREET

12 STREET

RANGE ROAD 14

RANGE ROAD 13

75 AVENUE

62 AVENUE

NEALE LAKE

DISCLAIMER:
THE INFORMATION PRESENTED IN THIS SERVICING ASSESSMENT IS FOR ANNEXATION PURPOSES ONLY AND ARE NOT INTENDED TO ALTER MARKET CONDITIONS. DEVELOPERS, LANDOWNERS AND PROSPECTIVE LANDOWNERS ARE RESPONSIBLE FOR UNDERTAKING THEIR OWN DUE DILIGENCE.

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ISL Engineering and Land Services

LLOYDMINSTER Canada's Border City

Legend
- City Boundary
- Study Area

City of Lloydminster

Servicing Assessment
Overall Utility (Storm, Wastewater, Water) Serviceability

Overall Serviceability Factor
- 1 to 7 (Short Term Development Potential)
- 8 to 11 (Medium Term Development Potential)
- 12 to 15 (Long Term Development Potential)

Figure 2.1

13631

1:50 000 (0, 500, 1000, 1500m)

August, 2013

3.0 Stormwater Management

3.1 General

Urban development results in increased runoff volumes and flow rates which may result in flooding, erosion, and increase pollutant load on downstream systems. As such, all new development must restrict storm runoff to pre-development rates by utilizing storm water management facilities (SWMF). The most economical method to maintain pre-development flow in the annexation areas will be to incorporate a series of storm water management facilities.

The purpose of the SWMFs is to provide both quantity and quality control. Quantity control is achieved by controlling the outlet rate from the SWMF and providing the required storage volume. Quantity management considerations involve evaluating the hydraulic conveyance capacities of downstream receiving systems to determine their ability to convey runoff from the proposed development. Typically SWMFs that discharge to an existing water body or watercourse are to drain at a pre-development discharge rate.

Quality control relates to the treatment of storm water including the removal of sediment and other pollutants. The level of treatment is typically set by municipal, provincial and federal regulators. Low Impact Development (LID) features such as bioretention areas (rain gardens, bioswales) and other methods can be implemented upstream in the catchment to treat and (where appropriate) infiltrate stormwater. SWMFs such as constructed wetlands and wet ponds are usually used as final treatment processes prior to release of flows to the downstream watercourse or body of water. Wet ponds, and to a greater extent wetlands and LID features, can provide varying removal rates of sediment, Biological Oxygen Demand (BOD), organic nutrients and trace metals depending on how long storm water is retained. A combination of these types of facilities should be considered to select a cost-effective drainage system that minimizes flooding and erosion and maximizes water quality improvement.

3.2 Topography

Most of the Study Area, as well as the existing City of Lloydminster, slopes from southwest to northeast with an elevation drop of about 43 m. The City currently drains via a series of storm trunks, SWMFs (about ten), and two major drainage channels (Northwest Storm Channel and East Storm Channel) to Neale Lake, located northeast of the City, east of the wastewater treatment plant. Approximately 4.5 sections of land south of the City located within the South UEA and Southeast Area drains southeast to local wetlands, water courses and the roadway ditch systems.

Because much of the Study Area is gently sloped, stormwater conveyance systems may need to be designed using minimum slopes. It should be noted that areas immediately adjacent to existing water courses and water bodies may have limited development potential. Limitations may be due to existing topography and ability to provide servicing to low lying areas. Some of this may be overcome by site grading and filling in low lying areas.

3.3 Environmental Constraints

The Environmental Inventory report identified 157 wetlands greater than 0.25 ha within the Study Area, with sizes ranging from 0.25 ha to 11 ha. The report also noted that the Province of Saskatchewan is currently drafting a new wetland policy, which would need to be considered upon development of wetland-containing areas (the City adheres to Saskatchewan's legislation respecting surface water resources).The Central UEA has a particularly high concentration of wetlands, which may impact the developability of those lands.

It was recommended in the Environmental Inventory that Class IV and V wetlands be retained as Environmental Reserve (ER), and possibly be integrated into the stormwater management systems of the new developments in order to enhance stormwater quality. Meanwhile, the Growth Study assumes that only those that are 1.0 ha in size or greater will be claimed by the Crown or retained by the City. Stormwater pre-treatment facilities (e.g. Low Impact Development measures, forebays, oil and grit separators) can be incorporated upstream of the wetlands to remove some sediment before discharge, which helps preserve wetland health. The Inventory also suggested that natural water courses may be preserved as part of the future stormwater management systems, and as much as possible they should be retained in a natural state rather than channelizing or piping. Stormwater treatment should also be incorporated before to discharge to the streams.

3.4 Existing System Upgrades for Future Growth

The 2009 Storm Drainage Master Plan evaluated the performance of the existing Lloydminster stormwater management system, and also identified upgrades required for existing and/or future development. Of the 18 upgrades identified in the Master Plan, 8 are related to future servicing of the Study Area in that they either improve the capacity of the existing storm system downstream of the Study Area, or result in the construction of trunks for needed for servicing. Table 3.1 identifies these recommended upgrades and the portions of the Study Area which benefit. The present status of the upgrades is also noted.

3.5 Study Area Servicing

The scope of the 2009 Storm Drainage Master Plan included identifying servicing schemes for future development areas which overlap with the current Study Area. The present servicing assessment makes use of these proposed servicing schemes, and revises or builds upon them where necessary to address the present Study Area, which constitutes only partial development of the ultimate Master Plan service area.

The proposed stormwater management strategy for the Study Area is illustrated on Figure 3.1. Potential SWMF locations for the Study Areas were identified in the 2009 Storm Drainage Master Plan, and are based on a review of the existing topography and location of receiving water bodies/watercourses. All locations are approximate and would be the subject of more detailed planning. The most strategic locations, from economic, environmental and servicing standpoints, should be determined when Area Structure Plans establish land use and confirm major road networks.

A discussion of the proposed stormwater management servicing of each of the expansion areas is provided below.

3.5.1 North Urban Expansion Area and Northeast Area

The North UEA (14 quarter sections) and Northeast Area (4 quarter sections) are situated within four storm drainage basins identified in the 2009 Master Plan (see Figure 3.1):

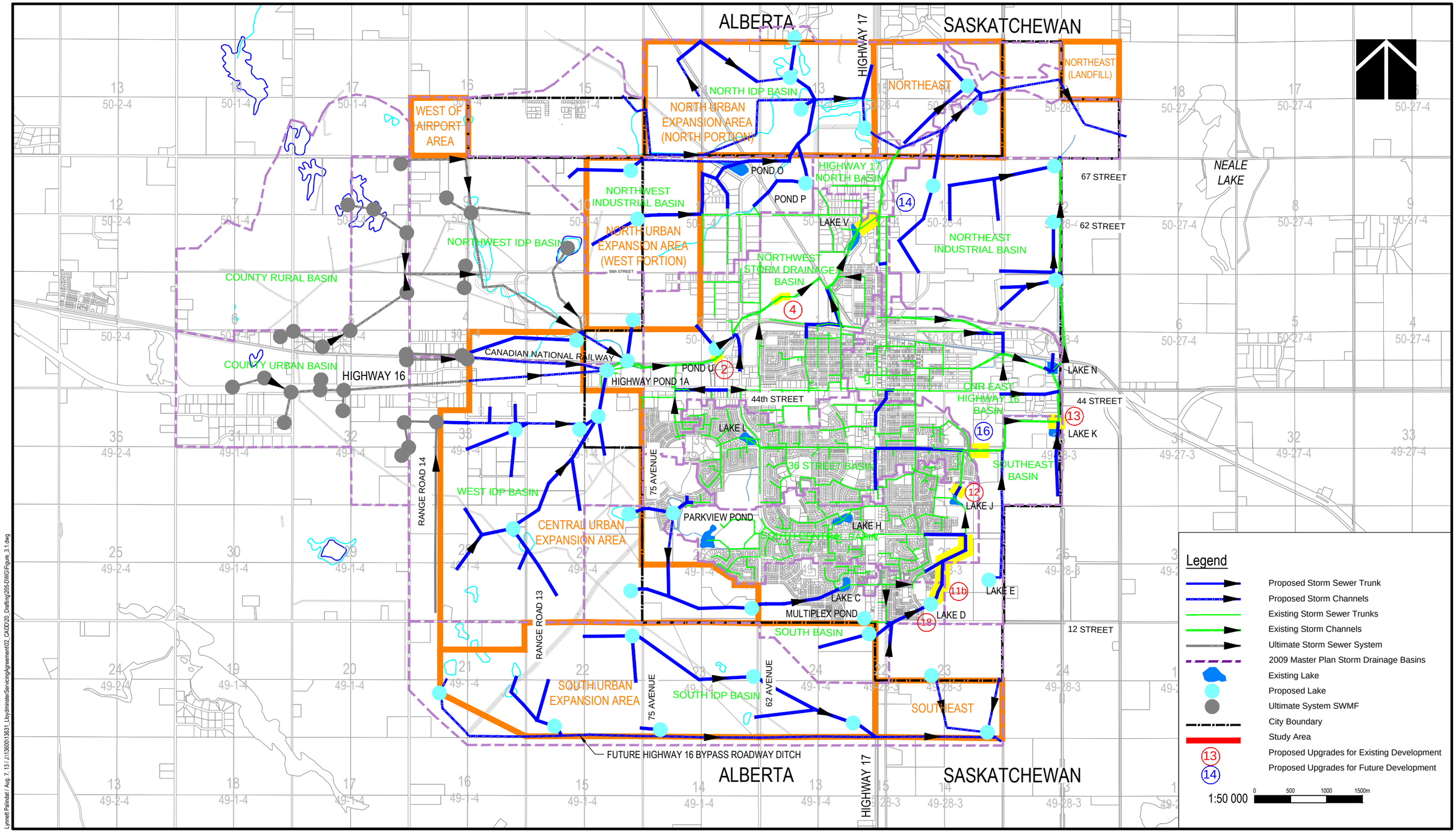
- North IDP Storm Basin (12 quarters-sections)
- Northwest Industrial Storm Basin (~4 quarter sections)
- Northwest IDP Storm Basin (1 quarter sections)
- Northwest Storm Drainage Basin (~1 quarter section)

North UEA (North Portion) and Northeast Area Drainage
The North IDP and Northwest Industrial Storm Basins are proposed to drain to the natural ravine/creek located within the Northeast Area, which discharges to Neale Lake. All flows from the North UEA and Northeast Area to this natural system would be discharged at the predevelopment rate of 2.5 L/s/ha. At the time of development, this natural feature should be evaluated to determine if any channel enhancements are required.

Table 3.1 Upgrades Recommended in 2009 Storm Drainage Master Plan Related to Future Growth in the Present Study Area

2009 Master Plan Upgrade # (Figure 2.1)	Location	Purpose	Conceptual Cost Estimate (2009 Dollars)	Study Areas that Relies on Upgrade	Upgrade Timing
2	CNR culvert	Provide capacity for future development. Downstream of future storm system.	$232,000	North UEA (West Portion) (~2 quarters), West Airport Area (1 quarter), Central UEA (~14 quarters)	City reports that preliminary design is complete and upgrade is proposed to be constructed in 2014.
4	Husky Refinery	Prevent Northwest Storm Channel overbank spill and flooding of Husky site. Downstream of future storm system.	$120,000	North UEA (West Portion) (~2 quarters), West Airport Area (1 quarter), Central UEA (~14 quarters)	Required immediately for existing conditions. City reports that this upgrade has not been scheduled for the near future. Timing is unknown.
11b	Trunk connection to Lake J	Prevent flooding along 46 Avenue. Downstream of future storm system.	$7,000,000	Central UEA (~4 quarters), South UEA (1.5 quarters)	Trunk from Pond D to 25 Street will likely occur at time of Pond D construction (outside of study area). City reports that the trunk has been constructed from 25 Street to Lake J, which relieves the immediate flooding concerns.
12	Lake J Outlet	Control outflows from Lake J and prevent flooding of Lake K. Downstream of future storm system.	$140,000	Central UEA (~4 quarters), South UEA (1.5 quarters)	City reports that this to be done in conjunction with development of the adjoining subdivision (outside of study area), which is downstream of the study area.
13	Lake K Outlet	Increase outlet capacity and prevent flooding to the north. Downstream of future storm system.	$180,000	Central UEA (~4 quarters), South UEA (1.5 quarters)	City reports that this to be done in conjunction with development of the adjoining subdivision (outside of study area), which is downstream of the study area.
14	Replace outlet pipe from Lake V under Highway 17; raise berm on north side of Lake V	Prevent spill from Lake V. Downstream of future storm system.	$67,170	North UEA (West Portion) (~2 quarters), West Airport Area (1 quarter), Central UEA (~14 quarters)	Required immediately for existing conditions. City reports that this upgrade has not been scheduled for the near future. Timing is unknown.
16	Twin 2100 mm culvert in East Channel under 43 Avenue	Prevent overtopping of 43 Avenue. Downstream of future storm system.	$218,800	Central UEA (~4 quarters), South UEA (1.5 quarters)	With future development near Lake D (outside of the study area), which is downstream of the study area
18	Construct Lake D and outlet to trunk	Provide capacity for westward expansion in the south basin. Only the outlet benefits the study area since storage will also be provided upstream of Lake D within the study area.	$3,760,000	South UEA (1.5 quarters)	With future development adjoining Lake D (outside of the study area), which is downstream of the study area.

Note:
Costs were obtained from the 2009 Master Plan and include engineering (10%), contingencies (40%) and GST (5%). Costs do not include pavement restoration.



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Stormwater Servicing Concept

NOTE:
FUTURE NETWORK ALIGNMENT IS SUBJECT TO FURTHER ANALYSIS AND DESIGN.

Figure 3.1

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Aside from possible channel enhancements, development in the Northeast Area and the North UEA (North Portion) is not dependent upon any of the existing or proposed storm systems for conveyance.

North UEA (West Portion) Drainage
The Northwest Industrial Basin will drain through the North IDP Basin via existing Pond O and proposed Pond P, on the way to Neale Lake. The four north quarter sections in the North UEA (West Portion) are included in this drainage basin. Existing Pond O currently discharges to natural channels in SE & SW 13-50-1-W4M (north portion of North UEA), which drain via the natural ravine/creek system to Neale Lake. When the North UEA (North Portion) develops, a storm trunk is proposed to replace the outlet of Pond O. The current capacity of the interim surface channels is unknown, and so it is uncertain if these four quarter sections in the west portion of the North UEA will be able to develop in advance of the permanent piped Pond O outlet, which would likely be installed as part of the development of the north portion of the North UEA.

A proposed dry pond for the existing Airport lands would also drain through the northern portion of the North UEA through roadway and natural surface channels, most of which appear to be existing although their capacity and condition are unknown.

The two south quarter sections in the North UEA (West Portion), which are part of the Northwest IDP Basin and Northwest Storm Drainage Basins, will drain to the Northwest Storm Channel, and so their development are contingent upon the recommended channel upgrades listed on Table 3.1 (Upgrades 2, 4, 14). Flows to the Northwest Storm Channel are to be controlled to 2.5 L/s/ha.

3.5.2 West of Airport Area

The West of Airport Area (1 quarter section) is part of the Northwest IDP Storm Basin identified in the 2009 Master Plan (see Figure 3.1). As such, it is proposed to drain south and east through a roadway and natural channel system to the Northwest Storm Channel. Based on airphotos, this drainage system appears to exist at present time, but the condition and capacity are unknown. Since most of the land between the West of Airport Area and the Northwest Storm Channel lies outside of the Study Area, and since the timing of system improvements resulting from development are unknown, storm discharge for this quarter section may need to rely on the existing system. Thus the condition and capacity of the existing downstream system to the Northwest Storm Channel would need to be confirmed at the time of development.

Since this area will drain through the Northwest Storm Channel, discharge will be limited to 2.5 L/s/ha.

3.5.3 Central Urban Expansion Area

The Central UEA is situated within two storm drainage basins identified in the 2009 Master Plan (see Figure 3.1):

- West IDP Storm Basin (~13.5 quarter sections)
- Northwest IDP Basin (~1 quarter section)
- South Storm Basin (~4 quarter sections)

The portion of the Central UEA located in the West IDP and Northwest IDP Basins is proposed to discharge to the Northwest Storm Channel, and as such is dependent upon Upgrades 2, 4 and 14 (Table 3.1). As long as development proceeds logically from northeast to southwest in this part of the Central UEA, storm servicing will not be a constraint to development. Flows are to be controlled to 2.5 L/s/ha since they are to be discharged to the Northwest Storm Channel.

The four south-eastern quarter sections of the Central UEA located in the South Basin are proposed to be serviced to a future trunk system that will extend across the south end of the existing City limits, connecting

into the proposed trunk sewer between Lake D and Lake J (Upgrade 11b). Through development activities, the 1650 mm storm trunk has been constructed to within 600m of the eastern boundary of the southern Central UEA. Development within these four quarters can progress logically from southeast to northwest in association with Upgrades 11b, 12, 13, and 16 (Lake D/Lake J/Lake K and associated trunk upgrades; Table 3.1), which will occur in conjunction with development in the southeast of the City

3.5.4 South Urban Expansion Area and Southeast Area

The South UEA and Southeast Area are situated within two storm drainage basins identified in the 2009 Master Plan (see Figure 3.1):

- South IDP Storm Basin (~12.5 quarter sections)
- South Storm Basin (~1.5 quarter sections)

Most of the South UEA and all of the Southeast Area are located in the South IDP Basin, which is proposed to drain to the southeast via roadway and natural drainage channels. The future Highway 16 Bypass highway ditch system will provide much of the SWMF outlet conveyance for this area, and so development will be tied to the roadway construction unless interim surface channels are identified. The capacity and condition of the downstream natural channel southeast of the City will need to be confirmed at the time of development. Flows from both the development area and the Highway 16 Bypass are to be controlled to 2.5 L/s/ha according to the 2009 Master Plan. Development flows will be controlled with SWMFs while the highway flows may be controlled by restricting culvert sizes.

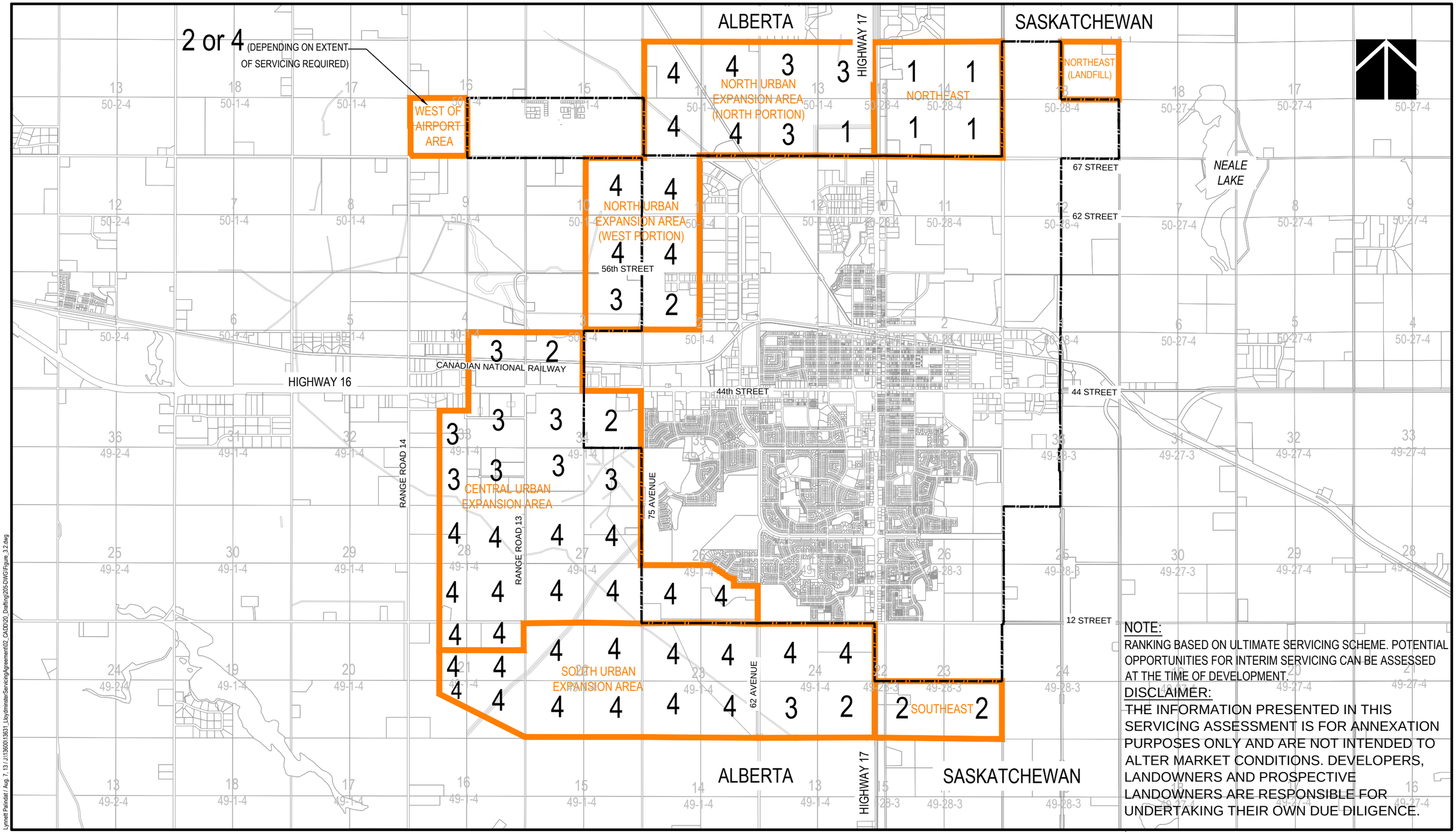
According to the Master Plan, a 1.5 quarter section area between 50 Ave and 59 Ave is proposed to be routed to Lake D to expedite commercial development adjacent to Highway 17, and so has been located in the South Drainage Basin. This servicing scheme relies upon Upgrades 11b, 12, 13, 16 and 18 (Lake D/Lake J/Lake K and associated trunk upgrades). The alternative would be to service to the south with the rest of the South UEA, which may have a more distant development horizon.

3.6 Staged and Interim Storm Servicing Readily Serviceable Lands

Provided the recommended upgrades listed in Table 3.1 are implemented, and development proceeds in an orderly fashion from downstream to upstream, all four areas are serviceable from a stormwater perspective. The Northeast Area and parts of the North UEA (North Portion) are the least constrained pending confirmation of the condition and capacity of the existing downstream surface channels, since no existing system upgrades are related to its development. The northeast corner of the Central UEA is also readily serviceable pending existing system upgrades for the Northwest Storm Channel and downstream system. The relative serviceability of each quarter section with respect to the coding developed in Section 2.0 is illustrated on Figure 3.2.

3.7 Interim Servicing Options

The Northeast Area, the North UEA (West Portion), the West of Airport Area and the majority of the Central UEA are all constrained by recommended upgrades to the Northwest Storm Channel, while the remaining 4 quarter sections of the Central UEA and 1.5 quarter sections of the South UEA within the South Basin are constrained by the Lake D/Lake J/Lake K and associated trunk upgrades in the southeast of the City. If the recommended upgrades listed in Table 3.1 are not implemented, interim servicing of the Study Area may still occur by alternative schemes. One example would be to utilize “zero discharge” storm facilities where the SWMFs would be sized for large enough to accommodate all runoff from the design (1:100 year) event with no discharge during the event. The pond would then drain slowly to the interim receiving storm sewer or channel after the event ends when the system has regained adequate capacity. This may require use of an automatic or manually controlled gate or valve to provide control of the outflow from the facility.
The majority of the South UEA and the Southeast Area are constrained by the timing of the construction of the Highway 16 Bypass, which may not occur for ten or more years, as the highway ditches are proposed to



NOTE:
RANKING BASED ON ULTIMATE SERVICING SCHEME. POTENTIAL OPPORTUNITIES FOR INTERIM SERVICING CAN BE ASSESSED AT THE TIME OF DEVELOPMENT.

DISCLAIMER:
THE INFORMATION PRESENTED IN THIS SERVICING ASSESSMENT IS FOR ANNEXATION PURPOSES ONLY AND ARE NOT INTENDED TO ALTER MARKET CONDITIONS. DEVELOPERS, LANDOWNERS AND PROSPECTIVE LANDOWNERS ARE RESPONSIBLE FOR UNDERTAKING THEIR OWN DUE DILIGENCE.

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City of Lloydminster

Servicing Assessment

Stormwater Serviceability

Legend
- City Boundary
- Study Area

Serviceability Factor
1 = Least Constrained
5 = Most Constrained
(SEE TEXT FOR COMPLETE DESCRIPTION)

1:50 000 (0, 500, 1000, 1500m)

Figure 3.2

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be used for discharge. However, discharge channels separate from the Bypass could also be constructed through the South UEA and Southeast Area developments to circumvent this constraint, although it would add to the servicing cost.

4.0 Wastewater Collection System

4.1 General

The City of Lloydminster wastewater collection system generally drains from southwest to northeast, following the topography of the area. The wastewater treatment plant is located in the northeast corner of the City on the Saskatchewan side. There is presently only one small lift station (North Lift Station) servicing the Communiplex, and the rest of the City is serviced by gravity.

In 2011 (subsequent to the 2009 Master Plan), the West Lift Station was decommissioned and the 1200 mm West Trunk was extended to 52 Street and 63 Avenue, where an interim connection to the existing 600 mm trunk was made. Ultimately, the 1200 mm West Trunk is to be extended north along 62 Ave and 59 Ave to the existing North Trunk.

On the east side of Lloydminster, the East Trunk collects discharges from most of the existing City area, and also receives discharge from the new South Trunk which is under construction through on-going development in the southeast corner of the City.

All four existing trunks, as well as proposed connecting future trunks, are included in the future servicing scheme for the Study Area.

4.1.1 Topography

The Study Area can be serviced by gravity, as determined by an assessment of the ground contours, with the exception of the Southeast Area which will require a lift station. As identified in the 2009 Master Plan, minimum pipe slopes will be required in the South Sanitary Basin (South UEA and part of the Central UEA) and Northwest Sanitary Basin to facilitate gravity servicing. The Master Plan also suggested that the Northwest Sanitary Basin could be serviced by a low pressure sewer system since low density development was proposed, although the ultimate servicing concept in the Master Plan showed a gravity system including the large diameter Northwest Trunk.

Interim servicing for the Study Area can generally be provided by gravity systems, although low pressure sewers may be proposed where the topography is marginal, or for other considerations such as cost. Minor lift stations are also possible for interim servicing schemes not considered in this high level study.

4.2 Population/Employment Threshold Analysis

Based on the review of the Sanitary Sewer Master Plan, the design capacities of the existing sanitary sewage treatment plant and collection system have been evaluated within the context of the Growth Study. With the exception of the treatment plant, which services the entire City, a population threshold with respect to the City as a whole is not meaningful to the discussion of the capacity of individual trunk sewers which service specific areas of the City. The timing of necessary upgrades for specific trunk sewers is dependent upon the rate of growth in their sewersheds. As such, the discussions that follows refers to population thresholds in terms of the extent of development as measured in gross hectares or quarter sections of land, with a range given if a mixture of residential and non-residential land uses are proposed in the sewershed.

4.2.1 Existing System Upgrades for Future Growth

The 2009 Sanitary Sewer Master Plan evaluated the performance of the existing Lloydminster wastewater collection system, and also identified upgrades required for existing and/or future development. Of the 12 upgrades identified in the Master Plan, 3 are related to future servicing of the Study Area such that those

upgrades either improve the capacity of the existing wastewater system downstream of the Study Area, or result in the construction of trunks that also service the Study Areas. Table 4.1 identifies these recommended upgrades and the portions of the Study Area which benefit. The population threshold or development stage when the upgrade is required, as well as the present implementation status of the upgrades, are also noted where applicable.

4.2.2 Wastewater Treatment Plant Capacity

Wastewater treatment plant (WWTP) capacity upgrades were completed in 2012, and the current headworks capacity is conservatively 13,000 m^3/hour (3.6 m^3/s, 312 ML/day). The Master Plan indicates that the current peak wet weather flow is about 2.2 m^3/s, and therefore the spare capacity (1.4 m^3/s) should be adequate to service an additional 1,950 to 2,100 ha (31 to 33 quarter sections) of residential and non-residential land, depending on the mix of land uses. This corresponds to a combined population and employment population of about 90,000. Since the currently undeveloped area within the City boundary (excluding any of the Study Area) is approximately 1,150 ha (18 quarter sections), 800 to 950 ha (13 to 15 quarter sections) of Study Area should be able to be serviced by the existing WWTP, although system capacities should continue to be monitored as development occurs. The total Study Area is about 54 quarter sections.

4.2.3 North Trunk and WWTP Outfall Twinning

The Master Plan identified that the North Trunk will ultimately require twinning to service future development. In this study, proposed twinning segments of the North Trunk have been identified as Stage 1, 2 and 3, relative to existing pipe capacity constraints and Study Area discharge points.

The North Trunk between MH 1035 and MH 1030 (part of Stage 1) currently has spare capacity of about 1,000 L/s (2009 Master Plan), with the exception of a flatter 150 m segment (0.16%) between MH 1031 and MH 1030 that has a remaining capacity of 170 L/s. Stage 1 will service the Northeast Area, North UEA (North and West Portions) and most of the Central UEA. Based on the lesser available capacity (170 L/s), there is not even sufficient capacity to service the remaining developable land in the existing City. Only 190 to 200 ha (3 quarter sections) of new development in the sewershed could occur before Stage 1 twinning is required. The serviceable area may be increased, however, if surcharge of the flat segment can occur without system basement flooding although this determination requires further hydraulic assessment that is outside the scope of this project. If surcharge is permitted, the 1,000 L/s constraint will govern and 1,050 to 1,150 ha (16 to 18 quarter sections) of Study Area could be serviced in addition to the existing City area. Those parts of the Northeast Area and North UEA (North and West Portions) beyond the City limits combined are 15 quarter sections.

The Stage 2 segment of the North Trunk has a limiting capacity of about 300 L/s (MH 1087 to MH 1045), although the remainder of the pipe has a spare capacity of 400 to 500 L/s. This segment services the North UEA (West Portion) and most of the Central UEA. Using the lesser capacity constraint (300 L/s), about 350 to 380 ha (5 to 6 quarter sections) of new development can be serviced by Stage 2. However, there is approximately four quarter sections of existing City area (outside the Study Area) still to develop in the sewershed. If it is assumed that full build-out of the existing City area occurs first, only about 80 to 110 ha (less than 2 quarter sections) of Study Area can be serviced prior to Stage 2 twinning.

The upstream segment of the North Trunk (Stage 3) has a spare capacity of about 900 L/s. This segment also services the North UEA (West Portion) and most of the Central UEA. Between 1,100 and 1,200 ha (17 to 19 quarter sections of Study Area can be developed considering full build-out of the existing City area (excluding the Study Area) in this portion of the sewershed.

Table 4.1 Upgrades Recommended in 2009 Sanitary Sewer Master Plan Related to Future Growth in the Present Study Area

2009 Master Plan Upgrade # (Figure 4.1)	Location	Purpose	Conceptual Cost Estimate (2009 Dollars)	Study Areas that Relies on Upgrade	Upgrade Timing / Population Threshold (where applicable)
2	900mm / 1200mm (East Trunk) twinning on 36 Street	Required to relieve basement flooding. The 1200mm twinning will also service future development.	$3,941,000	South UEA (~14 quarter-sections), Southeast, Central UEA (~6 quarter-sections)	Required immediately for existing surcharging. City reports that this upgrade has not been scheduled for the near future. Timing is unknown. Note: Sizing of this upgrade is dependent on other upgrades recommended in the 2009 Master Plan (Upgrades 4, 7, 9).
	East Trunk twinning (1200mm) from 36 Street to 52 Street		$6,418,000		
9	East Trunk twinning from 52 Street to WWTP	May be required to relieve basement flooding (further flow monitoring recommended in Master Plan). The twinning will also service future development.	$8,325,000	South UEA (~14 quarter-sections), Southeast, Central UEA (~6 quarter-sections)	May be required immediately for existing surcharging. Needs to be confirmed by flow monitoring. City reports that this upgrade has not been scheduled for the near future. Timing is unknown. Note: Sizing of this upgrade is dependent on other upgrades recommended in the 2009 Master Plan (Upgrades 2, 4, 7).
11	West Lift Station or West Trunk	Either upgrade the existing West Lift Station which is over-capacity, or decommission and construct the West Trunk. West Trunk will also service future development.	$6,811,000	Central UEA (~12 quarter-sections), North UEA (West Portion) (~1.5 quarter-sections), West of Airport Area (1 quarter-section)	City reports that the West Lift Station was decommissioned in 2011 with the construction of the West Trunk to 62 Ave and 53 St. An Interim connection has been made to the existing 600mm trunk, which has spare capacity (97 L/s) to service only undeveloped areas within the existing City boundary that are outside the study area (parts of SE3 and SW2 50-1-W4M, ~78 ha non-residential, PWWF = 77 L/s), plus about 22 ha (less than 1 quarter-section) of study area. The remainder of the West Trunk connection to the North Trunk (Upgrade 11) will need to be constructed for servicing of the study area.
No # (A)	North Trunk and WWTP Outfall twinning from west of 53 Ave To WWTP	North Trunk twinning will service future development, including the West Trunk catchment	N/A	Central UEA (~12 quarter-sections), North UEA (West and North Portions) (14 quarter-sections), Northeast, West of Airport Area (1 quarter-section)	WWTP outfall twinning is required immediately for existing surcharging. See Section 4.2.3 for discussion of North Trunk twinning staging to service study area development.

Note:
Costs were obtained from the 2009 Master Plan and include engineering (10%), contingencies (40%) and GST (5%). Costs do not include pavement restoration.

In addition, the outfall to the WWTP (MH 978 to MH 1018), which carries flows from both the North and East Trunks, is currently over capacity according to the Master Plan. Development in the North UEA (North Portion) and the Northeast Area will be constrained until both the WWTP Outfall and Stage 1 North Trunk pipe capacity limitations are addressed. The WWTP outfall upgrading (twinning with 1500 mm) would likely occur with the East Trunk twinning, the timing of which is currently unknown although it may be required immediately. Plans for the North Trunk twinning have not yet been made by the City.

In summary:

- The WWTP Outfall requires immediate twinning for existing development.
- North Trunk Stage 1 twinning will likely be required after 2 to 18 quarter sections in the Study Area (Northeast Area, North UEA (North and West Portions) and part of Central UEA) are developed, depending on development elsewhere.
- North Trunk Stage 2 twining will likely be required after 2 to 6 quarter sections in the Study Area (North UEA (West Portion) and part of Central UEA) are developed, depending on development elsewhere.
- North Trunk Stage 3 twining will likely be required after 17 to 18 quarter sections in the Study Area (North UEA (West Portion) and part of Central UEA) are developed.
- On-going flow monitoring is recommended to update remaining capacity estimates as development occurs.

4.3 Study Area Servicing

4.3.1 North Urban Expansion Area and Northeast Area

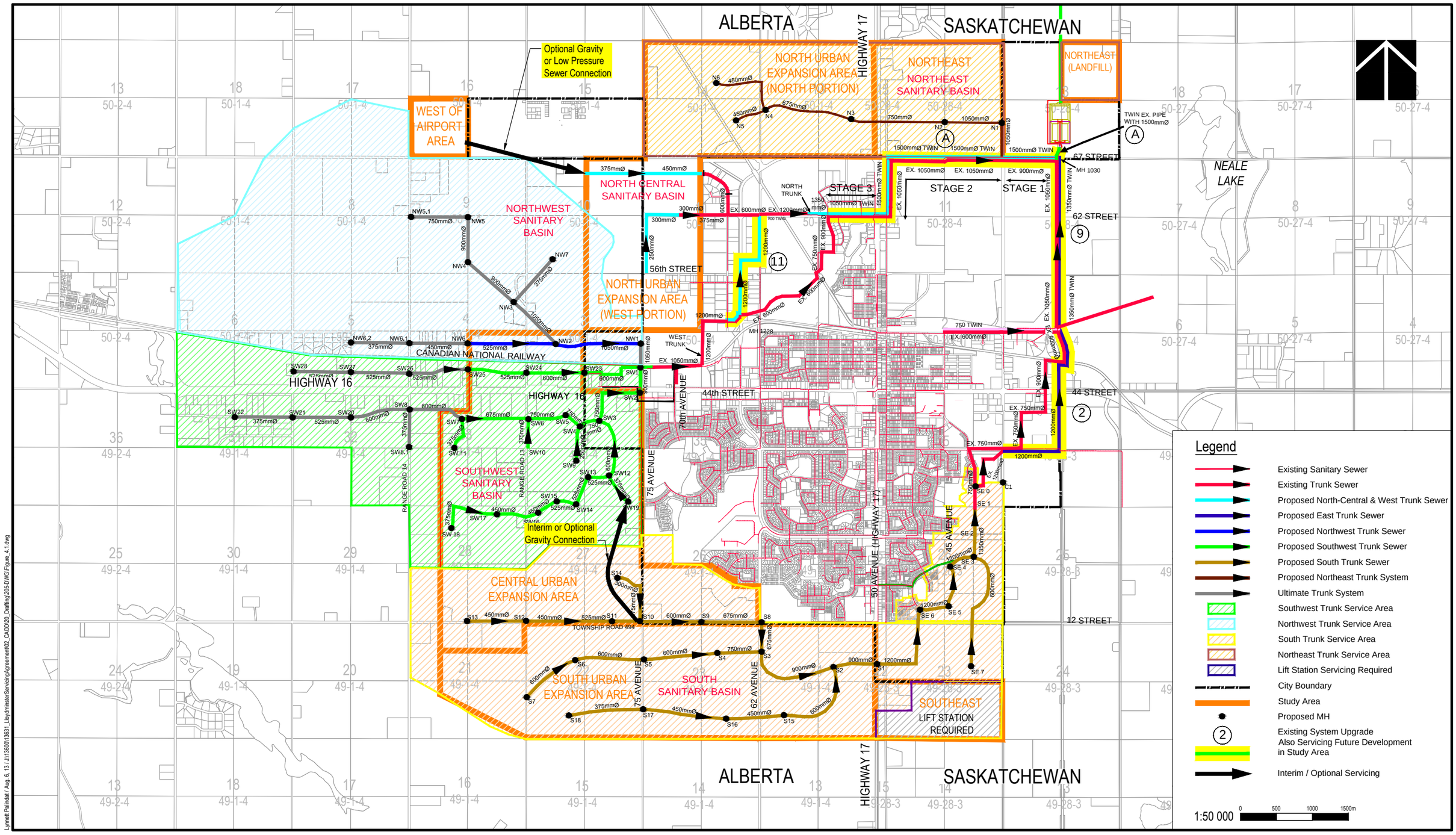
The North UEA is situated within three sanitary drainage basins identified in the 2009 Master Plan (see Figure 4.1):

- Northeast Sanitary Basin (8 quarter sections)
- North-Central Sanitary Basin (~5 quarter sections)
- Northwest Sanitary Basin (~1 quarter sections)

The Northeast Area is also situated within the Northeast Sanitary Basin (4 quarter sections).

The North UEA (North Portion) and the Northeast Area make up the Northeast Sanitary Basin identified in the 2009 Sanitary Sewer Master Plan, which is to be serviced by the proposed Northeast Trunk discharging to the North Trunk. The logical progression of development would be to have the Northeast Area develop first followed by the North UEA (North Portion), so that the Northeast Trunk may be constructed as development occurs. Full development would be subject to North Trunk twinning discussed in Section 4.2.3, although up to two quarter sections maybe be developed prior to Stage 1 twinning, depending on development elsewhere in the City and Study Area.

Most of the North UEA (West Portion) is part of the North-Central Sanitary Basin, and will discharge to the North Trunk via the proposed North-Central or West Trunk sewers. A small sub-area (~1 quarter section total) is part of the Northwest Basin. As described on Table 4.1, completion of the West Trunk (remainder of Upgrade 11) is required for servicing the parts of the North UEA (West Portion) and Central UEA that are located within the Southwest and Northwest Sanitary Basins. This is due to the 600 mm trunk currently servicing the west part of the City only having spare capacity for about 22 ha of Study Area plus 78 ha of new development in the existing City (i.e. parts of SE3 and SW2 50-1-W4M located outside the Study Area). Development in the North UEA (West Portion) is also subject to Stage 1 and 2 North Trunk twinning, as discussed in Section 4.2.3.



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Wastewater Servicing Concept

NOTE:
PIPE SIZES OBTAINED FROM 2009 SANITARY SEWER MASTER PLAN. IF INTERIM / OPTIONAL CONNECTIONS ARE MADE, DOWNSTREAM PIPE SIZES WILL REQUIRE CONFIRMATION.
FUTURE NETWORK ALIGNMENT IS SUBJECT TO FURTHER ANALYSIS AND DESIGN.

Figure 4.1

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4.3.2 West of Airport Area

The West of Airport Area (1 quarter section) was not included in 2009 Master Plan, but based on contours it could be considered either part of Northwest Sanitary Basin or the North-Central Sanitary Basin, with gravity servicing possible to both. As this quarter section is located in the upstream reaches of both sanitary basins, and away from the rest of Study Area, gravity trunk servicing to this site may be some decades away. Servicing to the North-Central Basin may be available sooner than the Northwest Basin; however, deep benched cuts of up to 10 m, or trenchless methods, may be required to install gravity sewer through the 2 to 4 m rise on 67 Street between the West of Airport Area and the North UEA. More typical trench depths (3 to 6 m) could be used if servicing is to the Northwest Basin.

Depending on the land use and development horizon for this area, interim and ultimate sanitary servicing for this area may also be provided by either on-lot systems (e.g. septic tanks), or low pressure sewer discharging to the upper branch of the North-Central Trunk sewer. It is also possible that a portion of this area may be used for airstrip extension, and as such may not require sanitary servicing.

The 2009 Master Plan (Appendix C) indicates that between 110 m to 410 m of existing 600 mm trunk on 62 Street may need to be upgraded if additional catchment area is added to the North-Central Trunk. However, this would need to be confirmed through flow monitoring and more detailed analysis to determine surcharge levels (basement flooding risk), since the Master Plan was developed based on limited data. Also note that low pressure sewer flows tend to be smaller than gravity flows since there is less opportunity for inflow and infiltration, and peaking factors are reduced due to on-lot storage with intermittent pumping. Therefore fewer downstream capacity impacts may be expected if low pressure sewers are used. However, low pressure sewers may also result in more operation and maintenance issues such as odour and corrosion of downstream systems due to hydrogen sulphide build-up.

If ultimate gravity servicing to the North-Central Trunk is intended for the West of Airport Area, the upper end of the North-Central Trunk in the North UEA (West Portion) should be installed 1 to 2 m deeper than suggested in the Master Plan.

If the West of Airport area is serviced instead through the proposed Northwest Basin, the additional flows may impact the existing 1050 mm portion of the West Trunk, which has been identified in the Master Plan as potentially being over capacity for ultimate development (the remainder of the West Trunk is being constructed as 1200 mm). However, the impact of flows from one additional quarter section on a trunk intended to accommodate about 45 future quarter sections is expected to be minor, and the need for upgrading of this portion cannot be accurately predicted at this time. The remainder of the proposed West Trunk should have adequate spare capacity to accommodate the flow from this area (2009 Master Plan, Appendix C).

The ultimate twinned North Trunk sizing proposed in the Master Plan (Appendix C) should be adequate to accommodate this additional area, whether it is serviced from the North-Central Basin or Northwest Basin. Nonetheless, development in the West of Airport Area would require consideration of the timing of Stage 1, 2 and 3 North Trunk twinning discussed in Section 4.2.3.

4.3.3 Central Urban Expansion Area

The Central UEA is situated within three sanitary drainage basins identified in the 2009 Master Plan (see Figure 4.1):

- Northwest Sanitary Basin (~1 quarter sections)
- Southwest Sanitary Basin (~10.5 quarter sections)
- South Sanitary Basin (~6.5 quarter sections)

Most of the Central UEA is situated in the Southwest Sanitary Basin, which is proposed to discharge to the West Trunk via the Southwest Trunk branches. As a result, the full development of this area is contingent upon construction of the remainder of the 1200 mm West Trunk to the North Trunk to relieve the existing 600 mm trunk, as well as North Trunk twinning. North Trunk twinning is discussed in Section 4.2.3, while West Trunk Twinning (required for development in both the North UEA (West Portion) and the Central UEA) is discussed in Section 4.3.1.

About 6.5 quarter sections of the Central UEA are proposed to be serviced by the upper branch of the proposed South Trunk system (located in the South Sanitary Basin), which will discharge to the East Trunk system. Therefore, the existing system Upgrades 2 and 9 (East Trunk Twinning) and WWTP Outfall Twinning, identified in Table 4.1, will be necessary for development of this area as part of the South Basin.

Since the 6.5 quarter sections are in the upstream reach of the South Sanitary Basin, development here may be delayed until most of the South Sanitary Basin and existing southeast area of the City are developed, unless interim servicing strategies are used. An option would be to transfer about 5 quarter sections to the Southwest Sanitary Basin on either an interim or ultimate basis. A gravity connection appears to be feasible using minimum slopes. The downstream proposed Southwest Trunk sewer would need to be sized appropriately to accommodate the additional flows, and the West Trunk construction and North Trunk twinning may need to be accelerated in the interim. If ultimate servicing to the Southwest Basin is considered, the size of the proposed West Trunk and the North Trunk twinning would need to be re-evaluated and possibly increased, along with a possible reduction in size of the South Trunk and the East Trunk twinning.

4.3.4 South Urban Expansion Area

The South UEA is located within the South Sanitary Basin identified in the 2009 Master Plan (Figure 4.1). It is to be serviced by the proposed South Trunk, which has just commenced construction through on-going development in southeast Lloydminster. The South Trunk discharges to the East Trunk, which is subject to Upgrades 2 and 9 (East Trunk Twinning), and WWTP Outfall Twinning (Table 4.1). According to the 2009 Master Plan, these upgrades may be required immediately for existing development (particularly Upgrade 2 and WWTP Outfall Twinning). Therefore, development in the South UEA will be delayed until these upgrades are constructed, along with extension of the South Trunk through the existing southeast City area. Interim servicing options for the South UEA are limited due to the distance from existing trunks.

4.4 Staged and Interim Wastewater Servicing

4.4.1 Readily Serviceable Lands

Due to proximity to existing trunks, the North UEA and the northern part of the Central UEA (nearest the West Trunk) are the most readily serviceable lands based on wastewater collection opportunities. If low pressure sewers or on-lot servicing is proposed for the West of Airport Area, then it can also be considered readily serviceable. Completion of the West Trunk, as well as Stage 1 North Trunk and WWTP Outfall twinning is required in the short-term for existing development and to enable growth in these areas. The southern Central UEA and South UEA are the furthest from existing trunk systems and require a substantial amount of infrastructure to be constructed in advance of their development. The relative serviceability of each quarter section with respect to the coding developed in Section 2.0 is illustrated on Figure 4.2.

ALBERTA

SASKATCHEWAN

1 or 4 (DEPENDING ON EXTENT OF SERVICING REQUIRED)

WEST OF AIRPORT AREA

NORTH URBAN EXPANSION AREA (NORTH PORTION)

NORTHEAST

NORTHEAST (LANDFILL)

NORTH URBAN EXPANSION AREA (WEST PORTION)

56th STREET

CANADIAN NATIONAL RAILWAY

HIGHWAY 16

HIGHWAY 17

67 STREET

62 STREET

44 STREET

44th STREET

12 STREET

NEALE LAKE

CENTRAL URBAN EXPANSION AREA

SOUTH URBAN EXPANSION AREA

SOUTHEAST

RANGE ROAD 14

RANGE ROAD 13

75 AVENUE

62 AVENUE

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City of Lloydminster

Servicing Assessment

Wastewater Serviceability

Legend
- City Boundary
- Study Area

Serviceability Factor
1 = Least Constrained
5 = Most Constrained
(SEE TEXT FOR COMPLETE DESCRIPTION)

1:50 000 0 500 1000 1500m

Figure 4.2

13631

August, 2013

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4.4.2 Interim Servicing Options

As detailed in Section 4.3, interim servicing options are summarized as follows:

- West of Airport Area
  - Service using on-lot methods (e.g. septic tanks), or low pressure sewer discharging to the North-Central Trunk in the North UEA.
- Central UEA
  - About five quarter sections of the southern Central UEA can be transferred to the Southwest Sanitary Basin on either an interim or ultimate basis (the Master Plan proposed servicing this area as part of the South Basin). Proposed downstream pipe sizing and construction timing, including the West Trunk and North Trunk twinning, would need to be re-evaluated in this case.

5.0 Water Distribution System

5.1 General

As described in the 2009 Water Distribution Study Update, the Lloydminster water supply system currently consists of the following components (with capacities noted):

- Raw Water Supply from the North Saskatchewan River (50 MLD limited by high lift pump capacity)
  - river intake (90 MLD)
  - low and high lift pumps (60 MLD and 50 MLD)
  - settling pond (120 MLD)
  - 35km, 750 mm diameter raw water supply line (60 MLD)
  - raw water reservoir (155 ML to 188 ML)
- Water Treatment Plant 2 (WTP 2, 30 MLD or 21.8 MLD net)
  - No distribution storage at WTP 2
- WTP 2 Distribution Pumphouse (378 L/s at 61m TDH, ground elevation 639.7m)
- West Reservoir (WR, 24.7 ML)
  - Currently filled off-peak from WTP 2 through the distribution system
- WR Distribution Pumphouse (206 L/s at 31m TDH, ground elevation 664m)
- Over 120 km of distribution piping (150 mm to 750 mm diameter)

The entire City currently operates as one pressure zone, with a difference in elevation of about 34 m between the southwest and northeast of the present City boundary. This results in high and low pressure extremes experienced in these corners of the City.

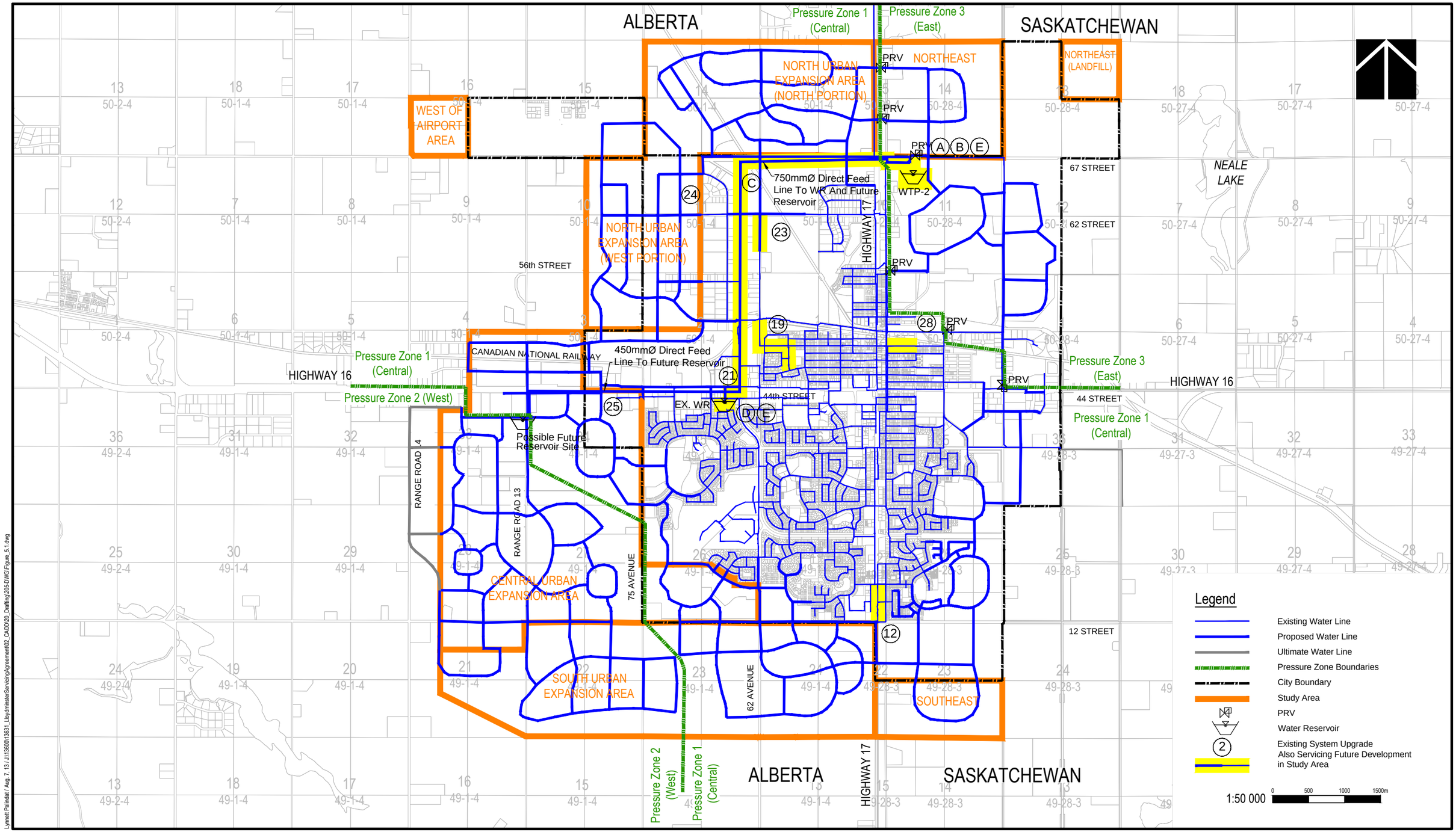
5.1.1 Topography and Future Pressure Zones

The addition of the Study Area, particularly the Central and South UEAs, would increase the elevation difference across the City to about 43 m and drive the creation of new pressure zones for the City. The 2009 Master Plan indicates the central core and northwest and southeast corners will remain in the original Pressure Zone 1 (Central), while future development in the southwest will be in Pressure Zone 2 (West), and in the northeast will Pressure Zone 3 (East). These future pressure zones are indicated on Figure 5.1, and ground contours are shown on Figure 1.1.

Additional infrastructure will be required to create the three zones. Approximately six PRVs will be required to delineate proposed Pressure Zone 3 (East), which will be fed from Pressure Zone 1 (Central). The 2009 Master Plan also proposed a new reservoir and pumphouse to service proposed Pressure Zone 2 (West). The future reservoir would be fed from an extension of the dedicated fill line between WTP 2 and WR.

5.2 Population/Employment Threshold Analysis

Based on the review of the Water Distribution Master Plan, the design capacities of the existing water treatment plant, reservoir storage and distribution system have been evaluated within the context of the Growth Study. The City's water treatment, distribution storage and pumping presently require significant upgrades to support existing development, and to allow for any future development. In effect, the current City population is the threshold value for the existing system. As the future capacities of the upgraded systems are presently unknown or unconfirmed, the future thresholds also cannot be calculated. However, detailed discussion regarding the existing system upgrades and Study Area servicing is provided below.



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ISL Engineering and Land Services

Lloydminster

Servicing Assessment

Water Servicing Concept

NOTE:
FUTURE NETWORK ALIGNMENT IS SUBJECT TO FURTHER ANALYSIS AND DESIGN.

Figure 5.1

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5.2.1 Existing System Upgrades for Future Growth

The 2009 Water Distribution Study Update (Master Plan) evaluated the performance of the existing Lloydminster water distribution system, and also identified upgrades required for existing and/or future development. The most of the distribution piping upgrades identified to improve local fire flows in the existing City have no direct impact on the serviceability of the Study Area, although any improvements to the overall system looping are always of some benefit. Of the 33 distribution piping upgrades identified in the Master Plan, 7 can be considered of direct benefit to the Study Area although not necessarily required for future development. More detailed study at the time of development will provide actual off-site servicing requirements. All of the upgrades are listed on Table 5.1 along with the portions of the Study Area which benefit. The present implementation status of the upgrades are also noted where applicable.

5.2.2 WTP 2, 750 mm Dedicated Fill Line and WR Upgrading

The Master Plan also identified several upgrades related to water treatment, storage and pumping at the WTP 2 and WR, including a dedicated 750 mm fill line, that are essential for future development in the Study Area (Upgrades A to E). The City has indicated that these upgrades have not yet been implemented and their timing is currently unknown. It must be stressed that according to the Master Plan, the water treatment and distribution system is currently at its design capacity, and therefore implementation of the Upgrades A to E are critical to development anywhere in Lloydminster. Monitoring and additional studies may be used to confirm the Master Plan conclusions and recommendations.

5.2.3 Consequences of Not Implementing Recommended Water System Upgrades

The upgrades detailed in Section 5.2.1 and 5.2.2 were recommended in the Master Plan to allow the City to achieve acceptable levels of service for its residents, and meet regulatory guidelines. For example, the Master Plan indicates that there is currently deficient fire flow pumping and storage capacity in the City. The consequences of not upgrading extend beyond the restriction of new development. Inadequate fire water supply (pumping and storage) can have insurance implications for existing developments in the event of a fire, as well as inhibiting the ability of new business developments to obtain coverage. Also, since the water treatment plant and potable water reservoirs (storage) are currently at their design limits, this puts the City at risk of water shortages during high demand periods such as summertime, which may result in more frequent water bans for residents. Eventually, if upgrades are not performed, residents will notice a decrease in water pressure during everyday use.

5.3 Study Area Servicing

5.3.1 North Urban Expansion Area and Northeast Area

The North UEA (North and West Portions) lies entirely within proposed Pressure Zone 1 (Central), according to the 2009 Master Plan. The Northeast Area will be serviced from Pressure Zone 3 (East), to be created by the addition of pressure reducing valves. Water servicing will be provided through the extension of the adjacent existing watermains into the area. The proposed system is shown on Figure 5.1.

Table 5.1 Upgrades Recommended in 2009 Water Distribution Study Update (Master Plan) Related to Future Growth in the Present Study Area

2009 Master Plan Upgrade # (Figure 5.1)	Location	Purpose	Conceptual Cost Estimate (2009 Dollars)	Study Areas that Relies on Upgrade	Upgrade Timing / Population Threshold (where applicable)
No # (A)	Water Treatment Plant (WTP) 2 - Double Treatment Capacity	Upgrade treatment capacity. Plant at design capacity with current population of ~28,000	unknown	All	Master Plan indicated that upgrade is required immediately to support growth, as plant is at design capacity. City indicates that timing of upgrade is currently unknown.
No # (B)	WTP 2 Pumphouse - Pump Upgrades	Pump upgrades to supply Peak (Max) Day Demand plus Fire Flow, and WR reservoir filling	unknown	All	Master Plan indicated upgrade required immediately for existing development. City indicates that timing of upgrade is currently unknown.
No # (C)	Dedicated 750mm Fill Line - 67 St from WTP 2 to 62 Ave, then south to Hwy 16 and WR	More reliable filling of WR, and enables raising of HGL at WR to better service high elevation areas in southwest	$11,096,000	All	Master Plan indicated upgrade required immediately, to be in place by 2014. Line is sized for ultimate service area including County areas. City indicates that timing of upgrade is currently unknown.
No # (D)	West Reservoir (WR)- Pump Upgrades	Pump upgrades to raise HGL and also supply Peak (Max) Day Demand plus Fire Flow	$98,000	All	Master Plan indicated upgrade required when the dedicated fill line is installed (by 2014). City indicates that timing of upgrade is currently unknown.
No # (E)	Additional treated water storage - WTP 2 (prefered, for fire supply after hours) and/or WR	Provide adequate storage to meet Saskatchewan requirements (2xADD). Currently at limit with population ~28,000.	$8,5000,000 for 9850$m^3$ storage at WR, unknown at WTP 2	All	Master Plan indicated that upgrade is required immediately to support growth. City indicates that timing of upgrade is currently unknown.
12	50 Ave (18 St to 12 St), 15 St (50 Ave to 49 Ave), 12 St (50 Ave to 49 Ave)	300mm and 250mm watermain looping to achieve fire flows	$1,076,400	South UEA	Required immediately for existing development.
19	57 Ave (47 St to 50 St), 50 St (57 Ave to 59 Ave), 59 Ave (50 St to 52 St)	250mm watermain looping to achieve fire flows	$1,523,200	North UEA	Required immediately for existing development.
21	44 St (62 Ave to 66 Ave)	250mm (or larger) watermain looping to achieve fire flows.	$574,000 (for 250mm)	Can be sized as 500mm for ultimate system to accommodate future development in Central and North UEAs.	Required immediately for existing development.
23	59 Ave (62 St to 59 St)	250mm watermain looping to achieve fire flows	$723,800	North UEA	Required immediately for existing development.
24	North UEA	Watermain looping to achieve fire flows	unknown, developer will pay	Development in North UEA will provide looping.	Will occur as part of development of North UEA
25	Central UEA	Watermain looping to achieve fire flows	unknown, developer will pay	Developoment in Central UEA will provide looping.	Will occur as part of development of Central UEA
28	50 St (49 Ave to 48 Ave)	400mm watermain looping to achieve fire flows	$311,550	Will improve 400mm transmission capacity to South UEA	Required immediately for existing development.

Note:
Cost include engineering (15%) and contingency (15%), but exclude GST.

5.3.2 West of Airport Area

Servicing for the West of Airport Area was not included in the 2009 Master Plan assessment. Since the area is isolated from the rest of the Study Area by a distance of 1.6 km, a standard pressure system with provision of fire flows may not be cost effective. Depending on the land use for this area (which may likely be airport expansion), the following servicing options may be more feasible:

- Standard pressure system, without provision of fire flows (small diameter pipes)
- Trickle-feed water system with private cisterns, also without provision of fire flows (even smaller diameter pipes)
- Private groundwater wells, if a few large lots are proposed and if groundwater supplies are adequate
- Truck-fill with private cisterns

If fire flows are not to be provided by a piped system, stormwater ponds with firefighting equipment standpipes/hook-ups can be considered.

5.3.3 Central Urban Expansion Area

The Central UEA is situated within two proposed pressure zones identified in the 2009 Master Plan (see Figure 4.1):

- Proposed Pressure Zone 1 (Central) (~7 quarter sections)
- Proposed Pressure Zone 2 (West) (~11 quarter sections)

The area located within proposed Pressure Zone 1 (Central) will be serviced directly from the existing WR, although the storage, pumping, and dedicated fill line upgrades for the WR listed in Table 4.1 are required to accommodate growth. Water servicing will be through extension of the adjacent existing watermains into the area (Figure 5.1).

The remaining area, to be serviced within the proposed Pressure Zone 2 (West), will require substantial additional infrastructure. The 2009 Master Plan proposes a future reservoir and pumphouse to service the new pressure zone, which will generally include lands with a ground elevation greater than about 664m. A limited amount of land within the new pressure zone could be serviced in the interim by a booster station, with storage supplied by the WR, however this interim servicing strategy is dependent on prior implementation of Upgrades A to E (Table 5.1). Until the upgraded storage capacity of the WR is known, an estimate of the interim booster pump service area cannot be made.

5.3.4 South Urban Expansion Area and Southeast Area

The South UEA is situated within two proposed pressure zones identified in the 2009 Master Plan (see Figure 5.1):

- Proposed Pressure Zone 1 (Central) (~7 quarter sections)
- Proposed Pressure Zone 2 (West) (~7 quarter sections)

The Southeast Area is located in Pressure Zone 1.

As with the Central UEA, the area located within proposed Pressure Zone 1 (Central) will be serviced directly from the existing WR, although the storage, pumping, and dedicated fill line upgrades for the WR listed in Table 5.1 are required to accommodate growth. Water servicing will be through extension of the adjacent existing watermains into the area (Figure 5.1).

Also as with the Central UEA, the remaining area (to be serviced within the proposed Pressure Zone 2 (West)), will require the future reservoir and pumphouse to service the new pressure zone. A second

booster station supplied from the distribution system in the south of the City may be able to provide interim servicing, however again this is contingent upon adequate storage capacity upgrades at WR (and possibly WTP 2).

5.4 Staged and Interim Water Servicing

5.4.1 Readily Serviceable Lands

The Northeast Area, Southeast Area, North UEA (North and West Portions), and the portions of the Central and South UEAs located within existing Pressure Zone 1 (Central) are the most readily serviceable lands based on water infrastructure. Depending on the water servicing strategy for the West of Airport Area, it may be more or less serviceable. The need for a new reservoir and pumphouse, or at a minimum a booster station to create the proposed Pressure Zone 3 (West), renders the remainder of the Central and South UEA less desirable for development from a water servicing perspective.

The relative serviceability of each quarter section with respect to the coding developed in Section 2.0 is illustrated on Figure 5.2. It must be noted, however, that all development is dependent upon water supply upgrades A to E (Table 5.1), to ensure a reliable water supply. For the purposes of the serviceability coding, the need for upgrades A to E is neglected for all quarter sections since the upgrades apply to all areas in the City. In effect, if this assumption were not made all quarter sections would be coded with “5” (i.e. major existing system upgrades required / major constraints).

5.4.2 Interim Servicing Options

As detailed in Section 5.3, the only interim servicing options considered are with respect to the proposed Pressure Zone 2 (West) areas of the Central and South UEA. On an interim basis, one or two booster stations could be used to supply the area from proposed Pressure Zone 1 (Central), as long as there is adequate storage capacity for future growth provided at WR and WTP 2 (see Table 5.1 and Section 5.2 regarding required existing water supply upgrades).

1 or 4 (DEPENDING ON EXTENT OF SERVICING REQUIRED)

WEST OF AIRPORT AREA

NORTH URBAN EXPANSION AREA (NORTH PORTION)

NORTH URBAN EXPANSION AREA (WEST PORTION)

NORTHEAST

NORTHEAST (LANDFILL)

CENTRAL URBAN EXPANSION AREA

SOUTH URBAN EXPANSION AREA

SOUTHEAST

ALBERTA

SASKATCHEWAN

Pressure Zone 1 (Central)

Pressure Zone 2 (West)

Pressure Zone 3 (East)

HIGHWAY 16

HIGHWAY 17

CANADIAN NATIONAL RAILWAY

56th STREET

44th STREET

67 STREET

62 STREET

44 STREET

12 STREET

62 AVENUE

75 AVENUE

RANGE ROAD 14

RANGE ROAD 13

NEALE LAKE

NOTE:
RANKING BASED ON ULTIMATE SERVICING SCHEME. POTENTIAL OPPORTUNITIES FOR INTERIM SERVICING CAN BE ASSESSED AT THE TIME OF DEVELOPMENT.

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City of Lloydminster

Servicing Assessment

Water Serviceability

Legend
- City Boundary
- Study Area

Serviceability Factor
1 = Least Constrained
5 = Most Constrained
(SEE TEXT FOR COMPLETE DESCRIPTION)

1:50 000 (0, 500, 1000, 1500m)

Figure 5.2

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August, 2013

6.0 Utility Servicing Summary and Conclusions

As previously described in Section 2.0, the overall serviceability of each quarter section in the Study Area is summarized using a coding system and illustrated on Figure 2.1, with individual utilities (storm, sanitary and water) illustrated on Figures 3.2, 4.2 and 5.2, respectively. The areas with the fewest constraints are: the entire Northeast Area; parts of the North UEA (North Portion – 1 quarter section; West Portion-2 quarter sections); and 2 quarter sections in the Central UEA near Highway 16.

The following conclusions can be drawn from this assessment, which is based on information contained in the 2009 City of Lloydminster Stormwater, Sanitary Sewer and Water Distribution Master Plans:

- While the ultimate stormwater management system will be comprised of substantial infrastructure as indicated on Figure 3.1, interim servicing schemes (e.g. interim discharge locations, possibly with oversized/staged ponds) may be possible to economically service development in areas where there are otherwise few constraints. An assessment can be made at the time of development.
- Timely implementation of West Trunk construction, East Trunk twinning, and North Trunk/WWTP Outfall twinning will enable sanitary servicing in the Study Area. Note that WWTP Outfall and East Trunk twinning may be required immediately (pending confirmation with flow monitoring), and the West Trunk construction will be required shortly. The timing of the North Trunk twinning depends on location of development throughout the City. Flow monitoring is recommended.
- Upgrades to Water Treatment Plant 2 and the West Reservoir, as well as construction of the 750 mm Dedicated Fill Line (Upgrades A to E, Table 5.1), are required at present to ensure reliable water supply for the entire City. Development anywhere in the City is dependent on these upgrades.
- The future Zone 2 (West) Water Reservoir and Pumphouse will be necessary to service much of the Central and South UEAs. This major infrastructure requirement will constrain development within the Zone 2 area. Interim booster station servicing options from Zone 1 can be explored at the time of development, pending implementation of water supply Upgrades A to E (above).

7.0 Transportation Network

7.1 General

The City of Lloydminster's current transportation network consists of the following arterial roads and highways:

- 44 Street (Highway 16);
- 50 Avenue (Highway 17);
- 75 Avenue;
- 62 Avenue;
- 40 Avenue;
- 62 Street;
- 52 Street;
- 25 Street; and
- 12 Street.

44 Street (Highway 16), which is part of the Trans-Canada Highway, bisects Lloydminster from the east to the west. In the future, Highway 16 will be realigned to the south as a bypass route. 50 Avenue (Highway 17) intersects Highway 16 near the geographic centre of Lloydminster, bisecting the City from the north to the south.

In general, the highways provide major connectivity in/out of Lloydminster. The arterial roadways are spaced approximately 2 quarter sections apart. These roadways provide major internal east/west and north/south connectivity throughout Lloydminster.

7.2 Existing Conditions/Capacity Constraints

The Transportation Master Plan (TMP), which was completed in 2010, evaluated existing conditions and capacity constraints. The existing conditions assessment was based on 2009 traffic volumes. Overall, Lloydminster was found to have an acceptable network. Some localized congestion was found on 50 Avenue, from 52 Street to 36 Street, but was not severe enough to warrant improvement.

7.3 Population Thresholds in the TMP

The TMP provided traffic analysis of three future population horizons including:

- the Short-Term (30,000);
- the Medium-Term (35,000); and
- the Long-Term/Full Build-Out (100,000).

The traffic analysis was completed through the use of a transportation model.

7.3.1 Short-Term (30,000) Population Scenario Traffic Analysis

For the short-term (30,000) scenario, population and employment growth was added to the model within the existing City boundaries, and the traffic impact due to this growth was evaluated. For this scenario, no roadway network improvements were identified as the base year (existing conditions) network was found to be sufficient. Overall, it was found that congestion levels are not significantly different from the base year

(existing conditions). This is a result of only a marginal increase in population and employment over the base year.

Overall, the network performed well with localized areas of light congestion including:

- 62 Avenue from 36 Street to 25 Street; and
- 36 Street from 62 Avenue to 57 Avenue.

The congestion level on these roadways was not severe enough to warrant improvements.

7.3.2 Medium-Term (35,000) Population Scenario Traffic Analysis

For the medium-term (35,000) scenario, additional population and employment growth was added to the model within the existing City boundaries, and the traffic impact due to this growth was evaluated. For this scenario, no network improvements were identified as the medium-term (30,000) network was found to be sufficient.

Overall, the network performed well with localized areas of congestion including:

- Highway 16 from 66 Avenue to 62 Avenue;
- 62 Avenue from 36 Street to 25 Street (heavily congested);
- the 36 Street/25 Street intersection (east leg);
- 50 Avenue (Highway 17) from 44 Street to 36 Street;
- 75 Avenue from 52 Street to 29 Street (heavily congested); and
- 40 Avenue south of 44 Street.

The segment of the 75 Avenue arterial identified above, which provides a connection between the north and central expansion areas, is heavily congested. This is due to substantial population and employment growth east of 75 Avenue which was assumed in the model.

7.3.3 Ten-Year Capital Plan

Lloydminster's Ten-Year Capital Plan for transportation infrastructure is provided in the TMP based on the results of the medium-term (35,000) population scenario. The projects included in the ten-year plan, which provide roadway capacity within the study area, include:

- extension of 62 Street west to 75 Avenue;
- extension of 52 Street west to 75 Avenue; and
- widening of 75 Avenue from 44 Street to 52 Street.

All of the three projects listed above will service the north urban expansion area identified in the IDP. Portions of these expansion area lands will be readily serviceable in terms of transportation needs with the construction of these projects.

The TMP also recognizes that widening 44 Street (Highway 16) is not ideal from a strategic perspective. It states that widening 44 Street duplicates the function of the Highway 16 bypass, and will effectively further defer its implementation. The Highway 16 bypass will provide east/west connectivity and will result in reduced volumes on internal roadways. This will reduce traffic congestion and provide additional spare roadway capacity for the existing and future residents within the existing and future City boundary. For these reasons the construction of the Highway 16 bypass should be encouraged.

7.3.4 Long-Term/Full Build-Out (100,000) Population Scenario Traffic Analysis

This scenario is the full build-out of the area within the current City boundary and includes full built out of the study area. For this scenario, the ten-year capital improvement plan was applied to the existing roadway network while other roadway improvements were based on approved land use plans (area structure plans and outline plans). Overall, traffic volumes resulting from this scenario have a severe impact on the roadway network. This is due to the high amount of development assumed in this scenario compared to previous scenarios with little improvement to the roadway network.

A few key findings of this scenario include:

- the 44 Street corridor will be severely congested without a Highway 16 bypass;
- the 44 Street corridor will be adequate with the Highway 16 bypass;
- there should be at least two access points to/from the Highway 16 bypass;
- due to the spacing of arterial roadways, all north/south roadways must be widened to four lanes divided; and
- 67 Street and 12 Street should also be widened to four lanes divided.

7.4 Staging of Improvements and TMP Update

The staging of roadway improvements should be consistent with the ten-year capital plan identified in the TMP. Beyond the ten-year capital plan additional roadway improvements should be determined based on updates to the TMP. For this, an interim traffic scenario should be analyzed, which is between the medium-term (35,000) and long-term (100,000) scenarios of the current TMP.

7.5 Arterial and Collector Roadway Network

The proposed arterial and collector roadway networks are shown in Figure 7.1. The arterial roadway network was based on TMP while internal collector roadways were based on networks from both the TMP and IDP. It should be noted that the arterial and collector road network are subject to change based on the forthcoming update of the City's TMP scheduled for 2014.

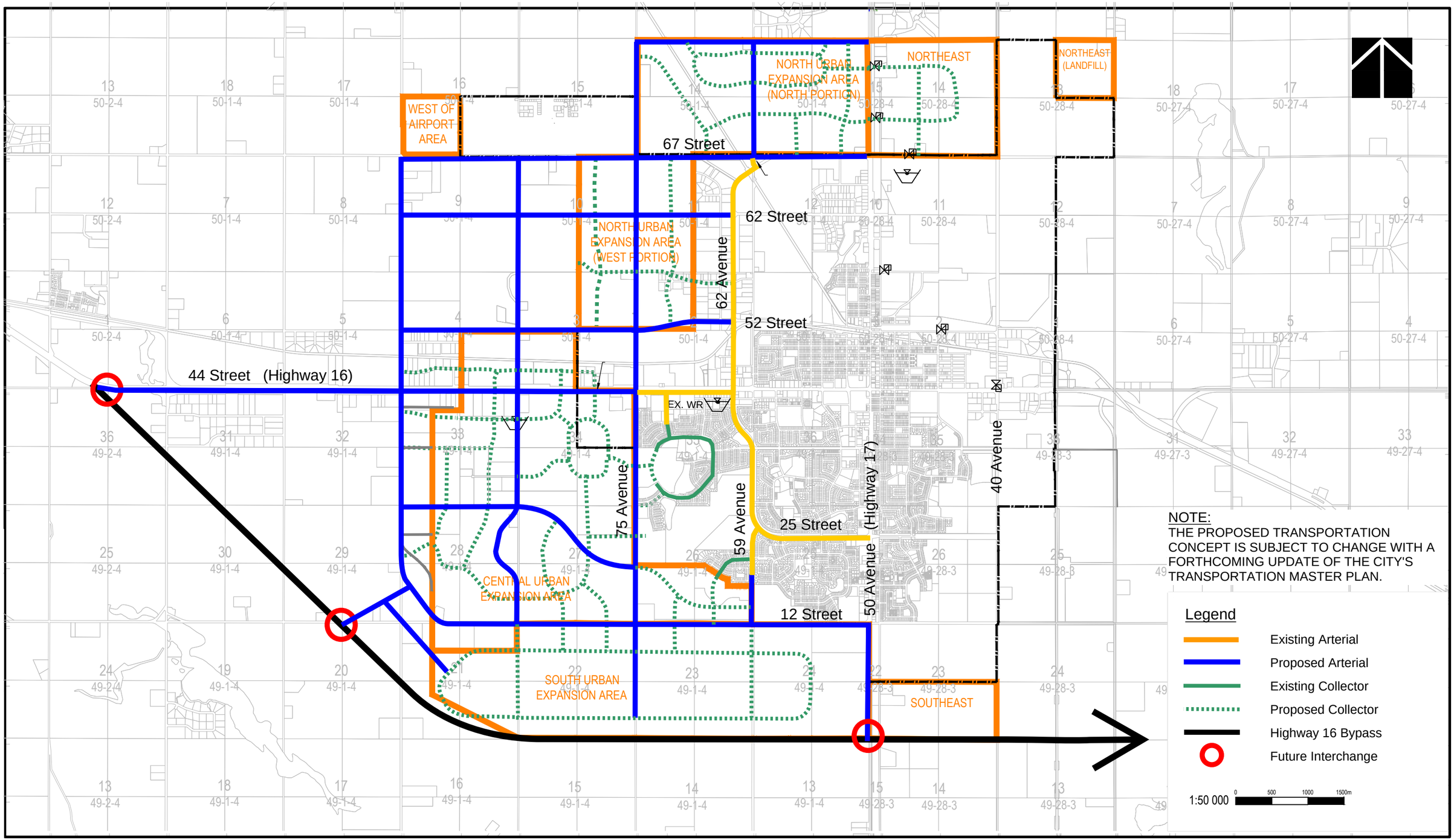
7.6 Other Considerations

7.6.1 Future Highway 16 Bypass Connections

Figure 7.1 shows the future Highway 16 bypass. Highway access along the bypass will be provided via an interchange at 50 Avenue (Highway 17) and an interchange at 12 Street. The number of required highway access points to the bypass should be reviewed through the 2014 TMP update. Additional highway access points may be required to accommodate growth within the urban expansion areas. The critical factor will be whether the arterials leading to/from the highway access points will be sufficient to accommodate the anticipated traffic volumes. An additional access point to/from the Highway will spread out traffic volumes and reduce traffic congestion on the connecting arterials. Reduced traffic congestion will lead to a better quality of life for residents. The current TMP states that at least two access points, 50 Avenue and 12 Street will be required. This implies that another access point is desirable.

7.6.2 Serviceability

The serviceability of the urban expansion areas in terms of transportation requirements, presented in Figure 7.2, was based on factors similar to those presented in Table 2.1 used for stormwater, wastewater and water.



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Lloydminster

Servicing Assessment

Transportation Concept

Figure 7.1

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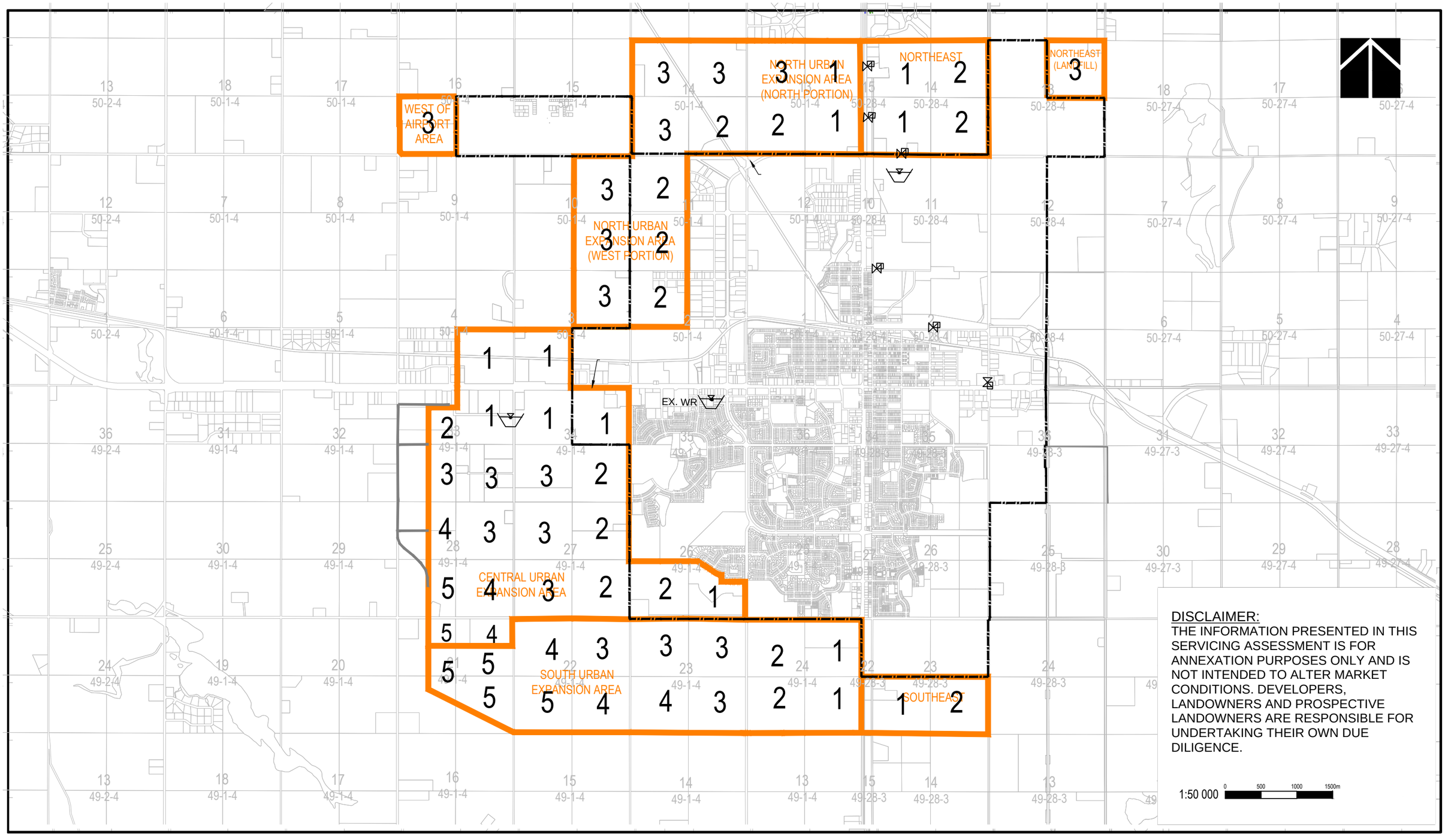

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Lloydminster

Servicing Assessment

Transportation Serviceablity

Legend

City Boundary

Study Area

Serviceability Factor

1 = Least Constrained

5 = Most Constrained

Figure 7.2

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June, 2013

7.7 Transportation Network Summary and Conclusions

The transportation network was reviewed based on the results of the City's current TMP, which was completed in 2010. The TMP evaluated the traffic impacts at future population scenarios including the short-term (30,000), medium-term (35,000) and long-term/full build-out (100,000).

The short-term (30,000) and medium-term (35,000) scenarios were considered the ten-year build-out and were used to determine the ten-year capital improvement plan. The ten-year capital improvement plan includes the widening of 75 Avenue from 44 Street to 52 Street. This also includes the westward extensions of 62 Street and 52 Street to 75 Avenue. These roadways will service the north urban expansion area.

The long-term/full build-out scenario includes full build-out of the area within the current City boundary and includes full built out of the IDP's urban expansion areas. Significant roadway improvements are required to service the full build-out of these areas. The timing of roadway improvements should be determined by the next update of the TMP.