

1. STUDY AREA

1.1 Overview

The Town of Sexsmith recently annexed additional lands bringing the area within the boundary limits to 1,294 ha (after annexation in April/07). Aquatera requested that the Study Area be extended one half mile beyond the existing boundary covering a total of 2,713 ha. The town boundary and study area are shown in Figure 1.1

1.2 Literature Review

Morrison Hershfield carried out a literature review of Sexsmith and Grande Prairie Water/Waste water systems and extracted relevant information for establishing key design criteria. The following reports were reviewed by Morrison Hershfield:

1. Water and Wastewater Infrastructure Study, Siemens Engineering Ltd, 1996
2. Town of Sexsmith Storm Drainage System –Review and Evaluation, GPEC consulting Ltd, 2000
3. County of Grande Prairie No.1 City of Grande Prairie, Town of Sexsmith Regional Water and Wastewater systems Final Report, ISL, 2001
4. County of Grande Prairie, Population Projections and Land Use scenarios in the Hwy 2 corridor (City of Grande Prairie to the Town of Sexsmith), UMA Engineering Ltd., 2004
5. Town of Sexsmith Mini Master Plan, AMEC, 2004
6. North County Industrial Subdivision Water Distribution System Master Plan, ISL, 2004
7. Areas Southeast of City of Grande Prairie - Servicing Study Report, ISL, 2004
8. City of Grande Prairie –Water Distribution System Master Plan, ISL, 2005
9. City of Grande Prairie –Wastewater Collection System Master Plan, ISL, 2005, 2005
10. Water System Master Plan- Grande Prairie- Clairmont corridor servicing strategy- Final Report, ISL, 2007
11. Wastewater System Master Plan- Grande Prairie- Clairmont corridor servicing strategy- Final Report, ISL, 2007
12. County of Grande Prairie No.1, Emerson Trail Area Structure Plan (Draft Copy), ISL 2007

13. Town of Sexsmith Annexation Report, ISL, 2007

14. Municipal Development Plan Sexsmith, Alberta, Town of Sexsmith

In addition to the above Morrison Hershfield also reviewed the following documents to identify key bench marking information:

1. Engineering Design Standards, City of Edmonton
2. Water distribution system design standards and sanitary catchments calculation standards, Aquatera Utilities
3. Engineering Design Standards, Regional Municipality of Wood Buffalo
4. Engineering Design Standards, City of Leduc
5. Engineering Design Standards, City of Calgary
6. Water Supply for public fire protection, A Guide to Recommended Practice, Fire Underwrites Survey, 1981
7. Distribution System Requirements for Fire Protection, AWWA, 1999
8. NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 2002
9. The following key data from Aquatera:
 - i. Billing and SCADA information: Water consumption from meters, reservoir flow and pressure
 - ii. Lift station details and pump start/stop analysis
 - iii. Archive as build drawings
 - iv. Regional Water line final design flows, 20 year population and land use Scenario
 - v. Rainfall data

1.3 Population

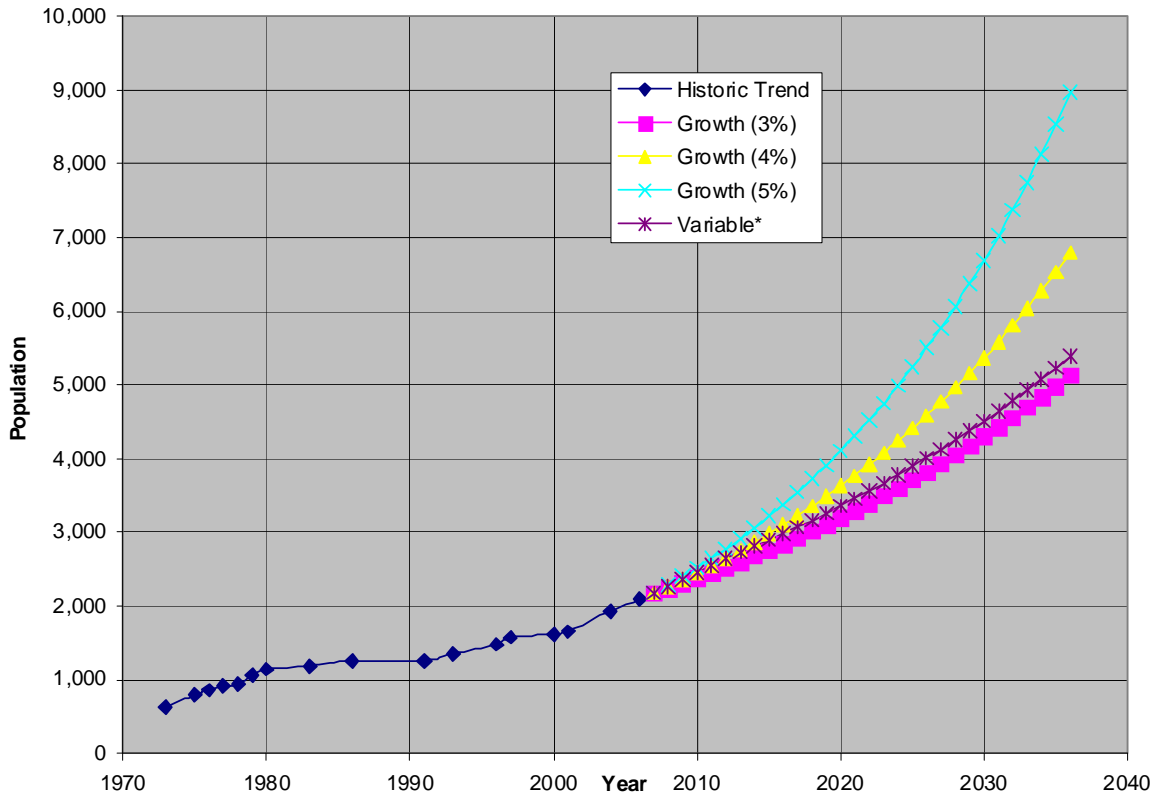
Sexsmith has had a varied growth over the years in what generally appears to follow the strength in the economy. Historic population data is provided here:

Year	Population
1973	632
1975	790
1977	912
1978	939
1979	1,064
1980	1,141
1983	1,184
1986	1,256
1991	1,260
1993	1,354
1996	1,481
1997	1,578
2000	1,615
2001	1,653
2004	1,934
2006	2,094

The historic average annual population growth rate in Sexsmith (1973 to 2006) is 4.9%. The average population growth for Grande Prairie (2001 to 2006) is 27.3%, and average growth across Alberta between 2001 and 2006 is 10.6%¹ Population is expected grow at steady rate over the next several years although sufficient study has not been completed to establish a firm expected rate. A variable growth rate (4% growth for first five years and 3% per annum after that) was proposed for the purpose of developing a master plan, which appears to fit more closely with the historic growth (See Figure 1.2).

¹ 2006 census of Canada

Figure 1.2 Population Growth Projections



NOTE: * Variable means 4% growth for first five years followed by 3% per annum

1.4 Land Use

1.4.1 Overview

Sexsmith has experienced rapid growth in the recent years, and the growth can be directly attributed to the growth in the city of Grande Prairie. Sexsmith is considered to be the preferred satellite town due to its close proximity to the City of Grande Prairie and the relatively low cost of living comparing Grande Prairie. As a result of this Sexsmith has developed a distinctly residential character. The recent twinning of Highway 2 has also helped Town’s growth by encouraging people to live in Sexsmith and commute to Grande Prairie for work. The town has also started initiatives to provide incentives for industrial and commercial growth. With the growth in the City of Grande Prairie and the surrounding regions, the town is expected to experience steady growth.

An Area Structure Plan or Land Use Plan indicating future growth areas is currently not available. Therefore it is difficult to accurately predict the magnitude and direction of future growth areas within the study area. Sexsmith’s growth in the past has been predominantly residential although there is great potential for Commercial/industrial growth in the area.

In this report, residential and commercial land use requirements are predicted based on the assumption that land use is linked to the population. A comparison of the ratio of the total population to the land use in gross ha is provided in the following tables.

Table 1.1 Residential Population Densities

	Typical values ²	Clairmont	Sexsmith (Current)	Sexsmith (Annexation report, 2007)	Value used in Master Plan
Persons/ Gross area (ha)	20 to 45	45	21	23	25

Table 1.2 Commercial Population Densities

	Typical values	Clairmont	Sexsmith (Current)	Sexsmith (Annexation report)	Value used in Master Plan
Persons/Gross area (ha)	15 to 30	42	30	26	26

It is assumed that future residential and commercial land consumption will grow as a proportion of the population, and the ratio of population to land use is assumed to be constant over the planning horizon. For the purpose of forecasting land requirements, a value of 25 persons per gross ha is used for calculating residential areas, and a value of 26 persons per gross ha is used for calculating commercial areas. The town currently has a gross residential area of 99.78 ha and gross non-residential (commercial and industrial) area of 69 ha. The residential and commercial area requirements for future are calculated in the following tables based on the assumed population to land area ratio.

² Typical Values for towns of similar size in Alberta

Table 1.3 Residential Land Projections (ha)

Year	Population	Land Area
2007	2,178	99.78
2017	3,072	123
2027	4,128	165
Ultimate (2108)	43,575	1,743

Table 1.4 Non-Residential Land Projections (ha)

Year	Population	Land Area
2007	2,178	69
2017	3,072	118
2027	4,128	159
Ultimate (2108)	43,575	897 (balance of available land)

1.4.2 Growth Plans

The Town of Sexsmith does not have a Land Use plan or Area Structure Plan outlining the future growth areas. MHL developed a Land Use Plan for the purpose of this master Plan based on the following assumptions:

- Developments will tend to happen south towards Grande Prairie as apposed to other areas, as Sexsmith is predominantly a satellite town for Grande Prairie.
- Highway light commercial is expected along Highway 2, and generally development will tend to follow the highway.
- Area south of the former canola crushing plant is likely to develop as an industrial area.
- Industrial and commercial areas will grow as a proportion of the population growth as identified in Tables 1.3 and 1.4.

A meeting was held with Aquatera and the Town to discuss the Master Plan. In the meeting, plans were revealed about the extension of existing development to the north, proposed developments to the east and northeast (ISANG Commercial), to the south (Painted Sky) and to the west. Morrison Hershfield modified the land use plan in consultation with the Town and Aquatera and the proposed land use plan includes the above areas within the 20-year envelope.

The county is currently involved in developing the Emerson Trail Area Structure Plan on the south side of Sexsmith. One quarter section (NW13-73-6-6, See Figure 1.1) from this development is within the study area. However the Emerson Trail developments are not included in the master plan as the majority of the lands lie outside this study area and are some distance from existing services.

The proposed land use plan showing the 5, 10 and 20-year growth envelope is shown in Figure 1.3. It should be noted that the area within the growth envelope identified in Figure 1.3 is more than the required area as calculated in Tables 1.3 and 1.4. This is due to some areas within the growth envelope being reserved for open space, park, etc. and allowances for municipal infrastructure and right of ways. The total area within the 2027 envelope at full build out without any open space can support a population of around 9,500 people. The population of the town will reach 9,500 only in 2056 (as per the population projections) and is beyond the 20-year planning horizon. Therefore for the purpose of flow projections only the gross area calculated in Tables 1.3 and 1.4 are used based on projected population growth.

The Water Network and the Wastewater Collection System discussed later in this report are based on an infill capacity of 25 people/gross ha. The following table illustrates the potential infill capacity within the 20-year growth envelope:

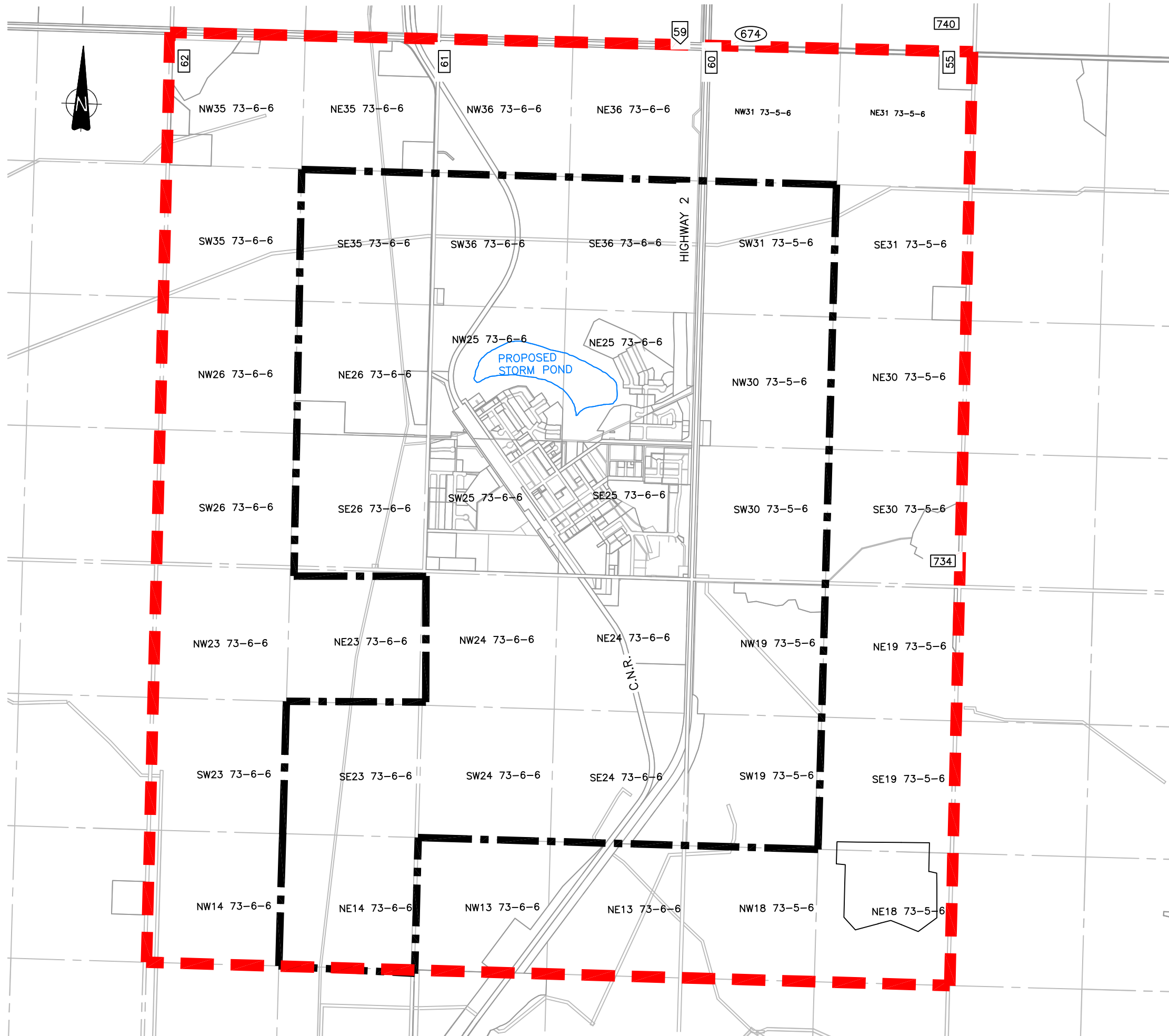
Table 1.5 Potential Infill Capacity within the 20 year Growth Envelope

Growth Envelope	Gross Residential Area available	Developable Area ³	Infill Capacity 25 people/ha	Total Population Capacity	Projected Population
2007				2,178	2,178
2012	125.00	96.25	2,406	4,584	2,650
2017	198.40	152.768	3,819	8,403	3,072
2027	32.70	25.179	629	9,033	4,128

The Water distribution system and Wastewater collection system infrastructure designed within the 20-year envelope therefore can support population in excess of the projected population. The 10-year growth envelope for example can support a population of 9,033 if 77% of the gross area is developed at 25 people/gross ha. This

³ 77% of the gross area is assumed to be developable

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LEGEND

STUDY BOUNDARY



TOWN BOUNDARY



AQUATERA UTILITIES INC.

2007 WATER AND WASTE WATER MASTER PLAN
FOR THE TOWN OF SEXSMITH

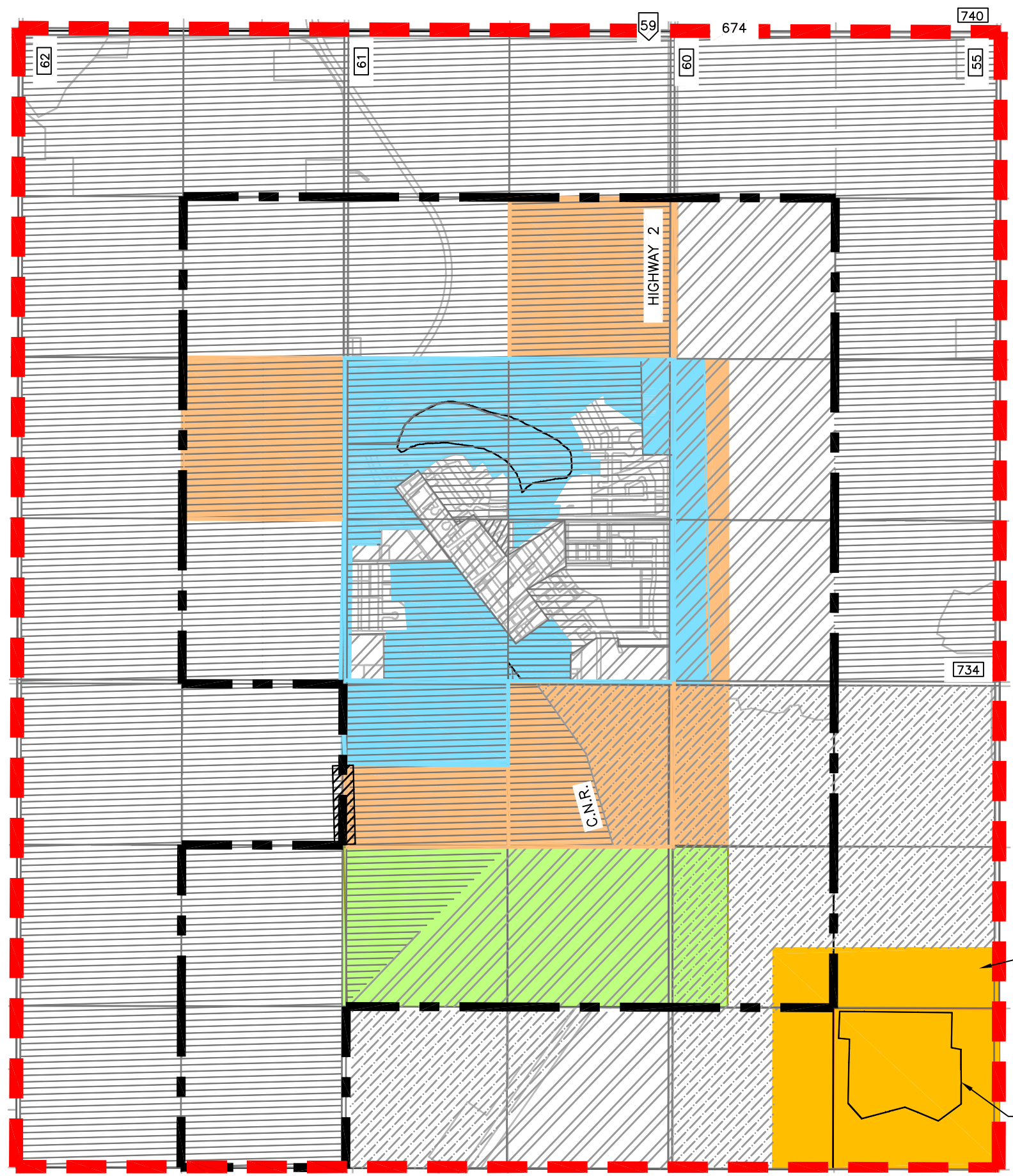
TOWN OF SEXSMITH STUDY AREA



APRIL 14/2009

FIGURE 1.1

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LEGEND

- RESIDENTIAL |||
- COMMERCIAL / / / / /
- INDUSTRIAL \ \ \ \ \
- STUDY BOUNDARY - - - - -
- TOWN BOUNDARY - ■ - ■ - ■ - ■ -
- 5 YEAR GROWTH ■
- 10 YEAR GROWTH ■
- 20 YEAR GROWTH ■
- SEWAGE TREATMENT AREA ■

LAGOON SETBACK REQUIREMENTS

LAGOON

AQUATERA UTILITIES INC.	
2007 WATER AND WASTE WATER MASTER PLAN FOR THE TOWN OF SEXSMITH	
LAND USE PLAN AND GROWTH ENVELOPES	
	APRIL 14/2009
FIGURE 1.3	

could support the Town’s projected population growth for more than 20 years. Therefore by utilising the infill capacity within the growth envelope to the full extent before opening up new areas for development, the Town can maximise the asset life of the Water and Wastewater networks.

It would therefore be preferable to encourage development within the identified areas and in an orderly fashion in order to avoid random developments that would result in extreme water and wastewater servicing costs.

1.4.3 Ultimate Development

The current town boundary can support approximately 40 years of population growth. The study area is approximately twice the size of the current town boundary.

Assuming a residential population density of 25 persons/Gross ha, the ultimate study boundary with an available residential area of 1,743 ha (gross) can support a population of approximately 43,575. Based on the variable population growth curve, the residential population of 43,575 is likely to happen in year 2108. From an asset planning perspective it is unreasonable to plan and make investments that do not show any benefit until far into the future.

It is recommended for financial planning perspective the following growth horizons are considered:

Table 1.6 Planning Horizons

	Planning Horizon	Population
O & M or Reactive asset planning	0-5 years	2,650
Proactive or Tactical Planning	5 – 10 years	3,072
Strategic Planning	10 –20 years	4,128

The Ultimate development situation could be used to provide a sense of the scale of the ultimate development but it is not advisable to use it for financial or asset planning purpose.