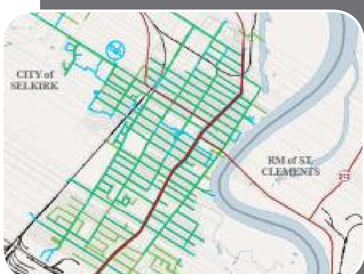
COMMUNITIES

TRANSPORTATION

BUILDINGS

INFRASTRUCTURE





CITY OF SELKIRK
WASTEWATER MANAGEMENT PLAN

APRIL 2012 | 5511160.111

PREPARED BY:

MMM GROUP

CITY OF SELKIRK

WASTEWATER MANAGEMENT PLAN

Prepared for:

The City of Selkirk, Selkirk and District Planning Area Board and the Province of Manitoba

Submitted by:

MMM Group Limited

April 2012

5511160.111

STANDARD LIMITATIONS

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1.0 INTRODUCTION

This Wastewater Management Plan (WWMP) is for the City of Selkirk (Selkirk). The WWMP integrates information from land use planning, capital planning and wastewater system needs and requirements for Selkirk. The WWMP is a document Selkirk can use to help provide a healthy and sustainable wastewater system in the context of local and regional development pressures. The WWMP identifies existing wastewater infrastructure and services, explores options for addressing issues or concerns regarding the provision of wastewater, and considers future development, expansion or upgrades to wastewater treatment components. The WWMP considers and integrates the infrastructure needs, summarizes land use goals and reviews the costs associated with the current system and options for future consideration.

Selkirk has a gravity fed sewer system with a wastewater treatment plant servicing most of the developed areas. There are two adjacent buildings in the Rural Municipality (R.M.) of St. Andrews that are connected to Selkirk's wastewater system. In the past, there has been discussion of extending wastewater services to serve additional lands. The Selkirk and District Planning Area Development Plan identified the option for Selkirk to service a much larger area in the R.M. of St. Andrews, south of Selkirk's boundary to provincial trunk highway number 44, with wastewater. However, there is little movement on this option at this time as the R.M. of St. Andrews is exploring other wastewater servicing options.

The challenges that Selkirk is facing over the next decades is to make changes to the wastewater treatment system to address the new nitrogen and phosphorous regulations, in a cost effective manner. This is expected to be a costly upgrade to the system and a more detailed implementation plan needs to be completed. Selkirk has already achieved sewer and storm water separation for about forty percent of the existing combined system, as of 2012. However, Selkirk would like to continue this work towards separating the combined sewer and storm water system, which would increase its capacity and better accommodate the regionalization of the system.

1.1 Study Area

Selkirk is an urban area located approximately 25 km north of Winnipeg, within the Selkirk and District Planning Area (SDPA). Situated along the west side of the Red River, Selkirk supports a range of urban land uses including industrial, commercial, institutional, recreational and residential (SDPA Development Plan, 2011). **Figure 1** identifies the location of Selkirk within the SDPA.

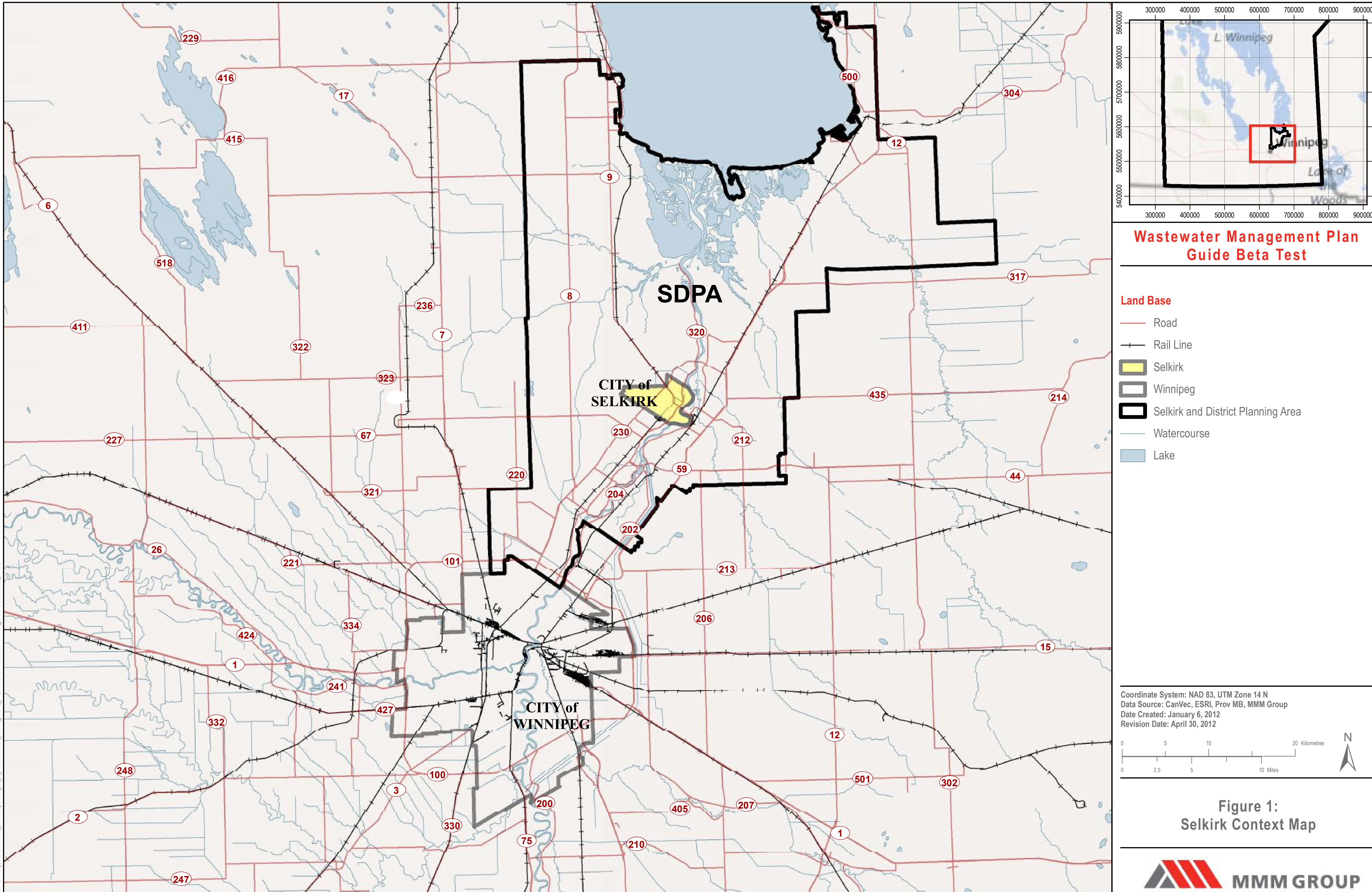

Figure 1:
Selkirk Context Map

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1.2 Methodology

MMM Group Limited (MMM) prepared the WWMP for Selkirk as part of a Beta Test of the Provincial Wastewater Management Plan Guide (Guide). The scope of work was to evaluate the Guide and find ways to improve the draft Guide. The Guide is to assist planning authorities and/or consultants in the process of producing a WWMP.

As part of the data collection and evaluation process, the following individuals were consulted:

- Mr. Randy Borsa, Chief Administrative Officer, Selkirk.
- Mr. Dan Repeta, Director of Operations, Selkirk.
- Ms. Sue Sutherland, Chief Administration Officer, R.M. of St. Andrews.
- Mr. Lloyd Talbot, Manager of Planning, SDPA.
- Ms. Jennifer Fergusson, Planner, SDPA.
- Ms. Cheryl Daher, Environmental Manager, Gerdau Manitoba.
- Ms. Katy Walsh, Policy Planner, Policy and Legislation, Manitoba Local Government.
- Ms. Kristy LeBaron, Manager, Policy and Legislation, Manitoba Local Government.
- Mr. Derek Dreger, Civil Engineer, MMM Group Limited.
- Mr. Darren Keam, Senior Soil Scientist, MMM Group Limited.

Electronic mapping data for the wastewater infrastructure was provided by Selkirk in computer aided design (CAD) format and MMM converted the data to geographic information system (GIS) in order to integrate and layer the data for the figures in the report. The SDPA provided the base maps, land use designations and building location data in GIS. MMM recreated the map prepared by Wardrop for the combined sewer separation program into GIS.

There were no engineering studies completed as part of this report. A number of resources, such as; engineering studies, by-laws and documents were used to complete the Selkirk Wastewater Management Plan including:

- “The Selkirk and District Development Plan” By-law 190/08, SDPA Board, 2010.
- “The Selkirk and District Planning Area Wastewater Servicing Plan”, SDPA Board, October 2010.
- “City of Selkirk WWTP Capital Needs Assessment Study – Regional Wastewater Contribution”, CH2M HILL, July 2007.
- “*The Financial Plan: The City of Selkirk For the Year 2011*”, City of Selkirk By-law No. 5194, April 26, 2011 which includes the five year capital plan.

- “The City of Selkirk Water and Sewer Rates”, The Public Utility Board Act Order No. 8/12, January 23, 2012.
- “Low Capacity Report”, Wardrop Engineering Inc. 2001.
- “Environmental Act Licence No. 2265R”, Province of Manitoba, 1988 (revised in 2008).
- “Report on the Public Sector Comparator”, Prepared by MMM Group for the Red River Infrastructure Committee, January 2008.
- “City of Selkirk Wastewater Treatment Facility Secondary Treatment”, AECOM, January 25, 2012.
- “Canada Census 2006 and 2011”, Statistics Canada, retrieved March 14, 2012 www12.statcan.gc.ca.
- “Water Conservation – Every Drop Counts”, Environment Canada, 2009.

These documents and interviews have provided the basis of information for this Plan.

2.0 EXISTING WASTEWATER MANAGEMENT SYSTEMS

The following sections provide a summary of the existing wastewater system characteristics in and around Selkirk.

2.1 Sources of Wastewater and Annual Production

Wastewater sources are predominantly from residential, commercial and industrial uses within Selkirk. The majority of wastewater is assumed to be from residential uses in Selkirk and this can only be estimated. Over the past few years, Selkirk’s economy has relied primarily on large-scale regional commercial developments (SDPA, 2011). There is also wastewater generated from the various small industrial business and recreational uses in Selkirk.

Gerdau Ameristeel (Gerdau), one of the larger steel mills in the prairie provinces that straddles the boundary of Selkirk and the R.M. of St. Andrews. The majority of the heavy industrial activity is located in the R.M. of St. Andrews and the office space is primarily in Selkirk. Gerdau is a significant water user and wastewater generator during the manufacturing process of steel products. However, Gerdau has its own wastewater treatment lagoon that treats water from only the manufacturing processing and has little impact on Selkirk’s wastewater system. The Gerdau treatment lagoon does not treat sewage effluent from the office buildings and the Selkirk wastewater system serves and treats this sewage effluent for Gerdau. The Gerdau treatment lagoon is located in the R.M. of St. Andrews on lands adjacent to Selkirk’s south boundary (west of PTH #9).

There are two other sources from outside Selkirk's boundaries that are connected to Selkirk's wastewater sewer system. The first is the Selkirk Behavioral Health facility in the R.M. of St. Andrews to the north of Selkirk. It is a drug and alcohol rehabilitation centre where male youth live, receive counseling and attend school. The second is the Mapleton Lanes condominium facility to the south, also in the R.M. of St. Andrews. These two facilities do not contribute a significant amount of wastewater to the overall Selkirk wastewater system.

Septage is hauled to the Selkirk treatment facility by truck from 78 residences in Selkirk that only have on-site systems; the majority of these are septic fields. However, recent construction in Selkirk has incorporated holding tanks versus septic fields. Selkirk does not allow septage to be dumped at the treatment facility from any sources outside of Selkirk's boundaries. This has been a recent policy change for Selkirk, as the facility had accommodated septage from adjacent communities in the past.

According to Environment Canada (2009), the average Canadian produces approximately 327 L of wastewater per capita per day. With a 2011 population of 9,834 (Statistics Canada), Selkirk residents would produce approximately 3.2 mL (megalitres or million litres) of sewage per day for residential usage (dry weather). This figure does not reflect the required peak flow values that the system should account for.

CH2M HILL (2007) calculated the total average daily dry weather volume generated in Selkirk as 513 L per capita per day. This figure incorporates average peak flow rates, which anticipate the need for a larger capacity of wastewater during peak periods of the day since wastewater is not generated at equal times of the day. The treatment facility has a maximum capacity of 34.1 mL/day. Sources of wastewater from Selkirk and the two neighbouring facilities that are connected to Selkirk's treatment plant are identified, the estimated population they serve, and daily volume per capita are outlined in Table 1.

Table 1: Wastewater Sources and Approximate Volumes – Selkirk WWTP

Wastewater Source	Estimated Population	Daily Volume per Capita (L)	Estimated Annual Volume (m^3)
City of Selkirk (Residential)	9,834	513	1,841,367
Mapleton Condos	98	TBD	5,300
Behavioural Health Centre	TBD	TBD	5,696

2.2 Current Water Demand Considerations

The volume of sewage produced in Selkirk is most likely lower than the Canadian average, due to the demographics found in Selkirk, as senior citizen makes up a significant part of the population. Seniors typically use less water than the average Canadian; however, as Selkirk begins to attract younger families then they should expect to see the average volume of water increase per household.

Selkirk recently retrofitted their civic office public washroom facilities with low flow toilets and urinals. Selkirk is promoting water conservation through educational programs. Informational pamphlets that promote ways to conserve water was developed and sent to rate payers. It is difficult to estimate the amount of wastewater that is being reduced from these water demand management programs. However, it is likely that these municipal initiatives to conserving water usage will result in reducing the amount of wastewater generated.

A pilot project will soon be implemented in Selkirk where an organization works with about 20 families over a period of time to educate them on changing their water consumption habits. Their stories will occasionally be the subject of media coverage in the community with hopes of educating others on how simple changes in habits can reduce water consumption and result in reduced amounts of wastewater produced.

2.3 Surrounding Rural Municipalities and Wastewater Issues

Selkirk is surrounded by the R.M. of St. Andrews to the north, west and south and the R.M. of St. Clements to the east, across the Red River. These rural municipalities have seen significant growth, primarily residential, and have recently experienced many failing on-site septic systems. There are regional opportunities to partner with the adjacent municipalities but there have not been any agreements established despite identifying this regional opportunity.

The Selkirk and District Planning Area Development Plan Map 15 and 16 (Appendix A, for Maps 15 and 16) indicates that the area in the R.M. of St. Andrews south of the Selkirk's boundary to PTH No. 44 should be serviced by Selkirk. Also, the Report on the Public Sector Comparator (MMM, 2008) for the Red River Infrastructure Committee identified wastewater servicing connections be extended to St. Andrews south of Selkirk to PTH No. 44. However, this option seems to be idle at this time.

The R.M. of St. Andrews was working with the R.M. of West St. Paul on a regional wastewater system however; this initiative is no longer being pursued. The City of Winnipeg recently announced that it is now entertaining regional servicing (water and wastewater) beyond its boundaries. The R.M. of West St. Paul is now working with the City of Winnipeg on extending these services to their community. The R.M.'s of St. Andrews and West St. Paul had received funding to construct a wastewater treatment plant and sewer system that would service both communities but the funding is threatened since the R.M. of West St. Paul is now interested in working with the City of Winnipeg. The two rural municipalities are working with the funding agency trying to find an acceptable way to use or redirect the approved funding in a beneficial manner. The R.M. of St. Andrews is looking at other options but has not met (to date) with Selkirk to explore extending their service.

The East Selkirk area in the R.M. of St. Clements was experiencing some on-site wastewater system failures and well contamination issues and has been under a Health Order since the late 1980s. At one time it was considered logical for East Selkirk to connect to water and wastewater services from Selkirk, under the Red River, however, the R.M. of St. Clements has decided to work on a new wastewater system for the community and regionalization is not currently an option.

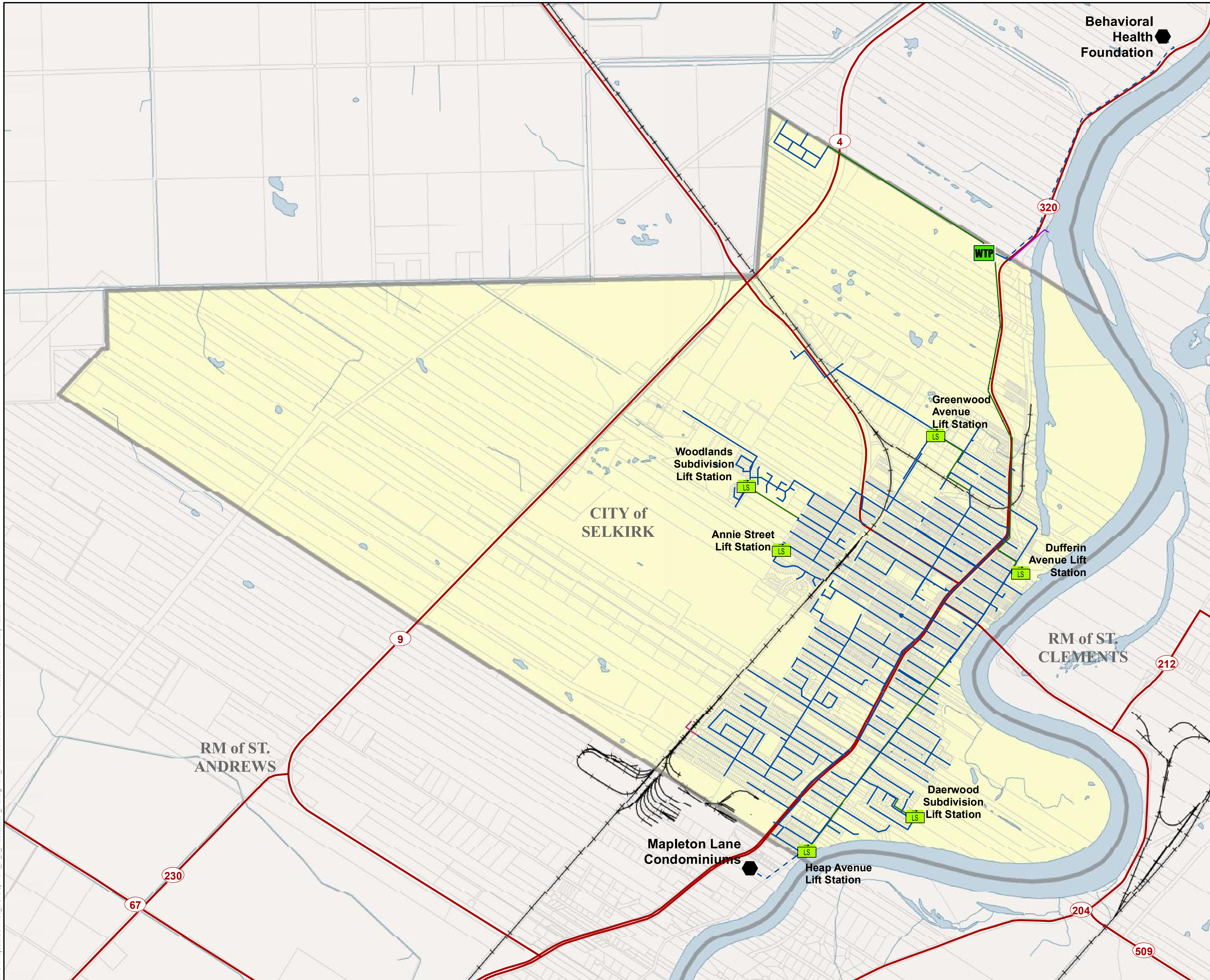
2.4 Wastewater Management System and Capacity

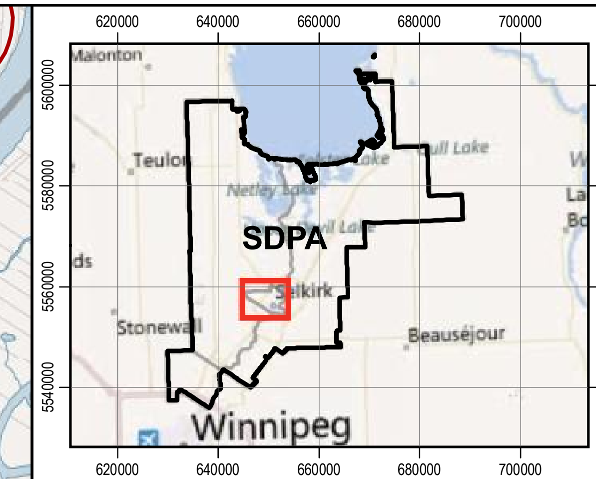
2.4.1 Selkirk's Wastewater Management System

Selkirk has an urban standard gravity sewer system. Under Selkirk's existing Environment Act Licence No. 2265R dated November 9, 2005, the WWTP must meet Biological Oxygen Demand (BOD), Total Suspended Solids (TSS) and Coliform effluent limits. Waste activated sludge goes to a set of five decant lagoons and then this supernatant is directed to the front end of the treatment plant. The Wastewater Treatment Plant (WWTP) was constructed in 1976 and consists of screening, grit removal, extended aeration treatment, clarification and ultraviolet light disinfection (CH2M HILL, 2007). Treated water is released into the Red River. The piped network, the WWTP and decant lagoons are depicted in **Figure 2**. The WWTP and decant lagoons are located on the very northern edge of Selkirk's boundary.

The older parts of Selkirk are serviced by a combined sanitary sewer system and storm water drainage system. Newer areas of Selkirk have separate sewer and storm water systems. Selkirk's first storm sewers were installed in approximately 1965 and in different areas of the City at different times, according to the municipal engineer.

Selkirk staff and Council understand that work needs to be done toward separating the sanitary system from the storm sewers. This is part of a plan for the existing operating licence for the treatment facility stipulated by Manitoba Conservation. There have been some major capital projects in the past that has started the separation process of the combined sewers. The stages and areas planned for separation are identified in **Figure 3**. The areas identified in yellow include Stage 1 (downtown), 2 and 4 are completed and Stage 3 (green) is planned to be the next area to address. To date, approximately 40 percent of the city's system of combined sanitary and storm sewers has been separated. The 2011 cost estimate for Stage 3 work is approximately $1,656,000. All other cost estimates in **Figure 3** are in 2001 dollars and costs will increase over time.





Wastewater Management Plan Guide Beta Test

Legend

- WTP Wastewater Treatment Facility
- LS Lift Station
- Forcemain
- Sanitary
- Outlet Pipe
- Sanitary (Beyond City Boundary)

Land Base

- Building
- Road
- Rail Line
- Watercourse
- Lake
- Rural Municipality
- Land Parcels
- City of Selkirk

Coordinate System: NAD 83, UTM Zone 14 N
Data Source: CanVec, ESRI, Prov MB, MMM Group, City of Selkirk
Date Created: December 10, 2011
Revision Date: May 8, 2012

0 250 500 1,000 Metres
0 500 1,000 2,000 Feet
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Figure 2: Selkirk Wastewater Infrastructure Inventory

MMM GROUP

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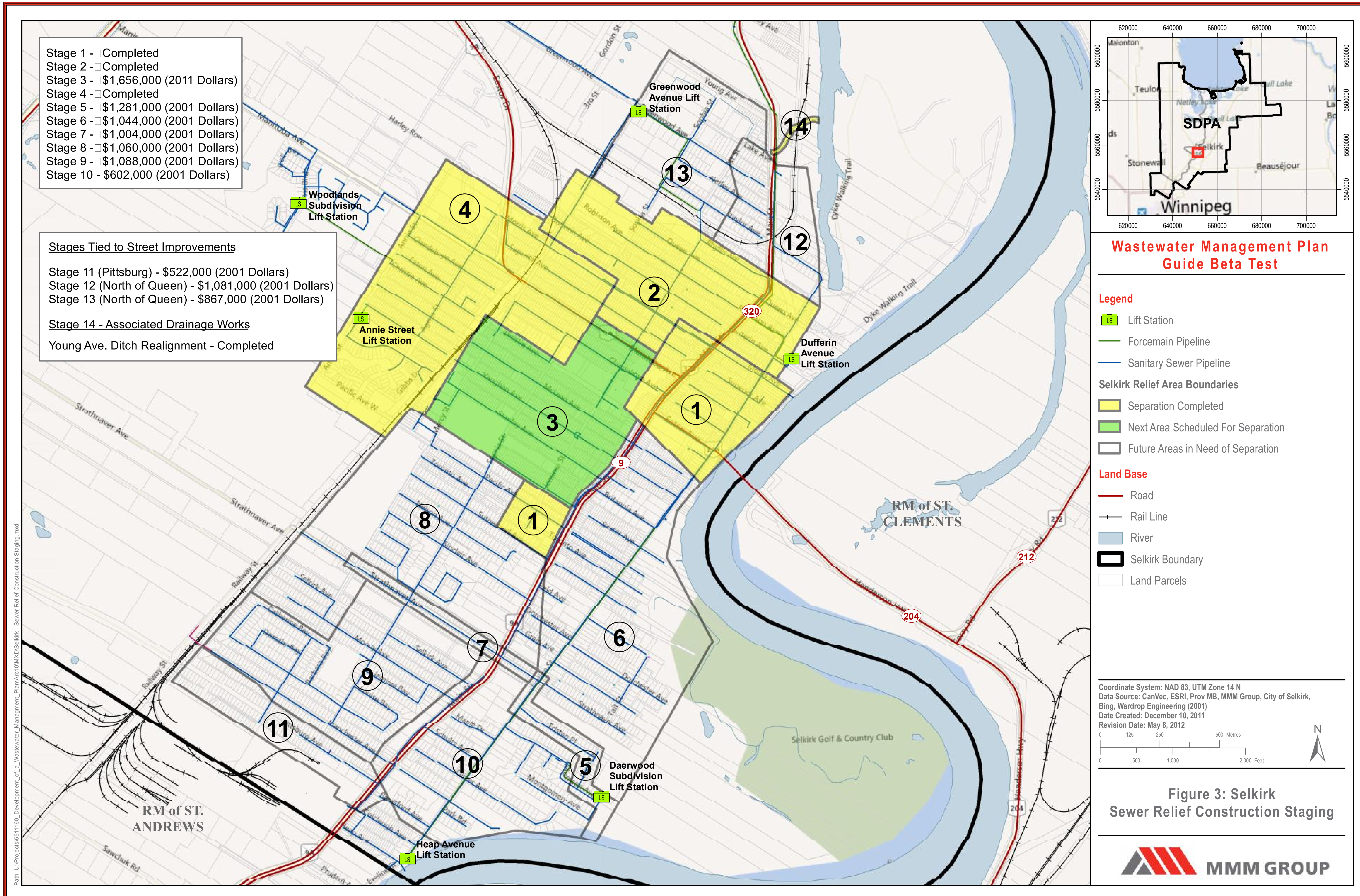


Figure 3: Selkirk Sewer Relief Construction Staging

Selkirk has six lift stations, identified in **Figures 2 and 3**:

- Heap Avenue
- Greenwood Avenue
- Daerwood Subdivision
- Woodlands Subdivision
- Annie Street
- Dufferin Avenue

There are two locations where the sewer system is extended beyond Selkirk's boundary and into the R.M. of St. Andrews: one to the north to the Behavioral Health Foundation facility and one to the south to a Mapleton Lanes condominium development. The wastewater from these facilities are connected by sewer lines and treated at Selkirk's WWTP.

The septage from the on-site wastewater system in the un-serviced parts of the residential areas in Selkirk is truck hauled to a dumping station located with the decant lagoons. The residential areas with on-site services have not experienced any reported environmental concerns. Additional un-serviced residential lots may be created if there is enough land for subdivision and there is adequate access to the lot. These residences can eventually be serviced by the municipal wastewater system once there is demand for new development. Extending the wastewater services is not cost effective or feasible at low densities.

Selkirk is planning to conduct sludge removal from the decant lagoons in about eight years and the sludge may be applied to agricultural land. Selkirk has applied sludge to agricultural land in the past and has also deposited sludge into its solid waste facility. Selkirk has been putting aside funding every year to have the funds available when it is needed to implement the sludge removal process.

2.4.2 Current Functionality and Recent Changes

The WWTP has a dry weather treatment capacity of 11.4 mL/day, a wet weather capacity of 34.1 mL/day and a hydraulic capacity of 40.4 mL/day (CH2M HILL, 2007). The WWTP currently has enough wastewater capacity to adequately support the needs of Selkirk.

Selkirk's WWTP at one time received sewage produced and hauled by truck from surrounding communities. Selkirk made a decision approximately two years ago to stop allowing outside haulers to use the facility, but it still accepts waste from haulers that are servicing residents and businesses from Selkirk within the city boundary. Today, a relatively low amount of septage originates from residential uses in non-serviced areas of Selkirk to warrant monitoring it closely.

The WWTP was equipped with a leachate receiving station for the collection of leachate trucked in from the BFI solid waste facility in Rosser, Manitoba. The leachate was found to be very hard on the treatment system because it was a concentrated source of impurities. This service generated about $50,000 per year of revenue but was terminated due to the negative impact it had on the treatment process. However, there are ways that the leachate could be entered into the system more strategically in order to not disrupt the treatment process. Further engineer study may be necessary if Selkirk entertains this option in the future. Selkirk integrates leachate from their solid waste facility in a manner that does not disrupt the treatment process negatively.

The WWTP is gated and locked and is fitted with lights and a closed caption camera system to control access and monitor septic truck haulers. Haulers are charged a fee for every visit depending upon the amount of waste they are dumping. The haulers log the amount of septage they dump every time they visit and they are billed accordingly.

The Gerdau wastewater treatment plant has adequate capacity for its needs and treats approximately 600,000 m^3 of wastewater annually. According to the Environmental Manager at Gerdau, the Gerdau wastewater lagoon is in good condition and is operating in accordance with its licence.

2.4.3 Current Condition

According to the municipal engineers, the WWTP is in generally good condition with a few maintenance and upgrades planned (see section 2.5.1). The primary focus for Selkirk is to make the necessary upgrades for the new nutrient regulations that are imposed for the removal of nitrogen and phosphorous. The system is required to meet the specifications of the *Nutrient Management Regulation* and the *Water Quality Standards, Objectives and Guidelines Regulation*. The Province of Manitoba is committed to reducing nutrient levels in Lake Winnipeg and has implemented a process to have communities start addressing more stringently the release of nitrogen and phosphorous. Selkirk will need to upgrade their plant to remove total nitrogen levels to below 15 mg/L and phosphorus levels to below 1 mg/L (CH2M HILL, 2007) by 2014. Selkirk is intending, as funds become available, to continue with its sewer separation program.

2.4.4 Environmental and Potential Health Concerns

Although the evaluation of whether the wastewater system may have any environmental or health issues is beyond the capacity of this study, if Selkirk increases its growth or increases its wastewater volumes by regionalization, it may need to address the combined sewers to reduce any potential emergency releases. Due to the combined sewer system, during periods of high precipitation, runoff from rainfall is collected within the same system as the domestic sewage which requires a significant increase in the capacity of the wastewater facility. When the system cannot handle the additional volume and the maximum flows are collected at the treatment facility; overflows are directed untreated into the Red River through bypasses in the collection system. However, according to the municipal engineers, there has not been an emergency release of the system in the last ten years.

2.5 Costs and Funding

2.5.1 Costs

Expenses associated with the wastewater system are divided into operating/maintenance costs and capital infrastructure expenditures. Development fees for the capital expenditures of providing new sewer lines to support new development (and other infrastructure) in Selkirk is based on the frontage size of each new lot. Consideration is made for the costs associated with the utilities (water and wastewater), roads and what Selkirk calls "people" capital amortization costs (protection services, general government services, environmental health services, economic development services, recreation/cultural services). These values are determined by cost per person and then cost per dwelling unit.

The expenditure for the Stage 2 sewer separation program was funded entirely by Selkirk through the capital budget (property taxes).

Since 2010, Selkirk has completed a significant amount of work into improving the safety, reliability and effectiveness of the WWTP (AECOM 2012). Selkirk has identified a few other upgrades to the WWTP that will need to be done in the near future, but the costs for repairs have not been calculated for the study at this time. The necessary capital upgrades include:

- Roof replacement on the treatment facility.
- Two air make-up units.
- Upgrade for nutrient removals (and associated studies and implementation plan).
- Upgrade totalizer for effluent from floppy disk.
- Scada upgrade.

It is Selkirk's goal to cover all operating costs for the wastewater system from the users. In order to recover these costs, Selkirk must apply to the Public Utilities Board (PUB) for revised rates for sewer and water utilities periodically. The 2011 application Selkirk made to the PUB was more comprehensive and reflected the true costs of the system rather than what has been considered in past applications. The application included the costs associated with staff time to provide the utility and considered costs from amortization expenses, debt servicing costs and offsetting taxation revenue. The most recent water and sewer rates approved by Selkirk are as follows:

Table 2: 2011 PUB Approved Sewer and Water Rates (Source: PUB, 2012)

Commodity Rate $/1,000 gallons		Revised			
	Previous	2011	Increase	2012	2013
Water					
First 50,000 gallons per quarter	$ 6.67	$ 7.33	10%	$ 7.33	$ 7.33
Next 450,000 gallons per quarter	$ 4.64	$ 5.78	25%	$ 6.34	$ 6.75
Over 500,000 gallons per quarter	$ 3.20	$ 4.32	35%	$ 5.61	$ 6.75
Sewer	$ 4.00	$ 4.37	9%	$ 4.37	$ 4.37
Quarterly Service Charge	$ 21.32	$ 26.50	24%	$26.50	$26.50
Minimum Quarterly*	$ 53.33	$ 61.60	16%	$61.60	$61.60
Bulk Water	$ 7.67	$ 7.98	4%	$ 7.98	$ 7.98
Hydrant Rental Charge	$110.00	$110.00	0%	$110.00	$110.00
Sewage Receiving Station					
Quarterly Administration Fee	$ 21.32	$ 26.50	24%	No further changes proposed	
Volume Dumping	$ 17.35	$ 21.12	22%		
B.O.D. Surcharge	$0.51/kg	$0.51/kg	0%		
S.S. Surcharge	$0.25/kg	$0.25/kg	0%		
Untested Dumping	$ 33.24	$ 36.44	10%		

Although there were some significant increases in cost to the utility users in some areas as identified in **Table 2**, there were no public objections heard at the public hearing for the rate increase.

According to the Capital Plan for 2011, expenditures listed under the "Sewage Collection & Disposal" category, there was $494,051 spent on the sewage treatment and disposal facility, and lift stations. This would be for the 2011 operation and maintenance of the wastewater system. There were some general operation fund debenture debt charges for sewer re-alignments and treatment plant upgrades. Principal and interest payments for these projects totaled $141,063. However, the total debenture cost charges for all Selkirk's projects was $279,948 which includes other projects such as water system improvements and these amounts are not broken down in more detail.

Selkirk allocates funds each year to utility reserves, in particular a utility replacement reserve and a reserve to help pay for the nutrient removal requirements needed for 2014. Selkirk allocated $454,952 to the utility reserve in 2011 and this is for all utilities and not strictly wastewater.

2.5.2 Financing Mechanisms

Financing mechanisms that Selkirk uses include utility fees, development fees, utility reserves, and capital project funding derived from property taxes and support from other levels of government (special projects) to finance the wastewater system (capital and operating). Selkirk has a capital budget that is for special capital projects as needed and is not strictly for wastewater needs, and competes with other projects that may take priority (water system upgrades, library, etc.). Utility fees are calculated in a similar manner and were described in the previous section.

In the 2011 Capital Budget, the total revenue for funds collected from utility users for water and sewer services are combined into one category and divided into five subsections: residential, commercial and bulk, industrial, federal and provincial, municipal and schools. The total revenue generated from water and wastewater in 2011 was $2,423,906. It is difficult to estimate how much of this operating revenue is from water and wastewater only. Assuming a fifty-fifty split between water and wastewater is not accurate because some homes are on private wells (which are metered) and only are charged the sewer rates thus creating an imbalance in the revenue projections.

Selkirk charges the Mapleton Lane condominiums operating and maintenance costs of the wastewater system. However, because the development is situated beyond the legal jurisdiction of Selkirk, the city works with the R.M. of St. Andrews to facilitate the wastewater service billing to the property. This ensures that if Mapleton Lane condominiums do not pay for the service, the cost can be attached to their tax bill. The amount of wastewater generated is based on the amount of water that is used (and metered). The R.M. of St. Andrews charges the users the rate Selkirk is charging and adds a fee for administering the process and a percentage for future replacement cost of the sewer line that runs through St. Andrews. Selkirk also applies an annual development fee to the users. In total, the Mapleton Lane condominiums pay approximately $1,000 a year development fee to Selkirk.

Selkirk has recently developed a fee calculator that helps determine the true cost of development and these costs are passed on to developers. This revenue formula recognizes the benefits of infill development over greenfield development. Selkirk encourages infill development by applying reduced development fees/levies than those charged for development in new areas. Urban densification for Selkirk was seen to have economic, environmental and social benefits including more efficient use of infrastructure. For example, a 55 foot (16.7 m) lot proposed in a new area that requires additional service extensions will be charged a development fee of $3,147.36 (2010 fees). Whereas, a developer would be charged $1,967 for the same sized lot in an existing neighbourhood. This is a difference of $1,180 per lot. This tool complements the Development Plan policies that encourage infill development.

Septage haulers are charged a fee of $21.12, a general cost per 1000 gallon (4546 L) load. Truck haulers must report to the office to get access and record the estimated volume of waste they are dumping.

2.5.3 Financing Limitations and Challenges

There are some challenges with the capital financing of the wastewater system in Selkirk. Because all capital funds are placed in one capital reserve account, all capital projects are competing for the same funds. Other projects tend to take priority over wastewater related projects. Much of the utility capital funds are currently being directed to Selkirk's water system upgrades due to a past proposal underestimating the scope of work needed. Additional funds were needed to complete the project.

The dependence on property taxes for funding the combined sewer replacement program is very challenging and it takes a long time to save for major projects that have large budgets. Having the intent and long-term plan for wastewater improvements is good, but the replacement of the system will take many years, despite the recent progress made, if the reliance is primarily by property taxes.

Whenever there is a drop in water use, Selkirk receives less revenues and then falls short of its budget projections. This revenue shortfall was seen in 2010 because it was a wet year. Wet weather may reduce the need for residents to water lawns or wash cars, etc. When there is a significant reduction in use of water consumed by residents this causes the revenue to fall below the planned/projected estimates resulting in a shortfall. Because the wastewater utility charge is tied to metered water usage, less water consumption means less funds collected to cover operating costs. Although reducing water usage through demand management programs is a responsible approach to take, reduced water consumption will have an impact on the amount of revenue collected.

The CH2M Hill report indicated that the cost of treating truck haul septage waste is much higher than the cost that is charged for the service. It is difficult to charge more as the R.M. of St. Andrews lagoon does not charge a dumping fee. As the cost for infrastructure systems increase in Selkirk, only a reasonable amount can be charged back to the residents. If taxes and costs for households and businesses get too high, people may look to move to other locations that charge less for taxes and utility services.

Complying with new regulations places a strain on local resources. The challenge is for municipal governments to pay for WWTP upgrades to comply with these new provincial wastewater regulations. The AECOM 2012 engineering study has indicated a variety of cost options for different treatment methods that comply with the regulations. The City needs direction from the province before deciding the best method but the options are a significant cost. Allocating funds for these upgrades will detract from the other capital projects needed in the Selkirk.

2.6 Summary Observations and Considerations

Some observations and considerations Selkirk may explore further to better assess and calculate the effectiveness of the wastewater system are:

- Selkirk should discourage development in un-serviced areas to reduce the occurrence of additional on-site wastewater systems within the city boundary and ensure that this additional subsidization of this wastewater treatment method does not continue. Implement a policy in the SDPA Development Plan that restricts development to serviced areas within city limits. Recently, a few subdivisions (lot splits) have been approved contrary to the Development Plan.

- Selkirk should continue to find other sources of revenue for the wastewater system to ensure that users of the system pay for the system, in a fair manner. Innovation programs such as the reduced fees for infill development is a good example of innovative financing that integrates good planning with infrastructure efficiencies.

3.0 PROJECTED NEEDS AND CONSIDERATION

3.1 SDPA Development Plan Policies

The Selkirk and District Planning Area Development Plan By-law No. 190/08 (Development Plan) is used to help guide land use and future development decisions in the planning district, adopted in accordance with *The Planning Act* (2006). The Development Plan (Part 4) outlines objectives and policies to address wastewater servicing and treatment as follows:

- Densification of residential development in Selkirk, where appropriate services can be provided, will be encouraged to make the provision of sewer and water services increasingly fiscally feasible.

- Large development proposals shall be guided by secondary or concept plans to consider phasing of infrastructure and in order to determine service provision requirements for the subject property as well as adjoining lands.

- Options for effective waste management and treatment shall be considered to ensure cost effectiveness and sustainability.

- New or expanded development, including proposed subdivisions, shall be limited so as to ensure that there are facilities and the capacity in place to adequately manage the waste that will be generated. This includes solid, liquid and septage waste.

There are a number of land use designations in Selkirk that can support additional development which include: urban neighbourhood, business park, downtown mixed use industrial, regional commercial, regional institutional, and resource land. Additional densification may occur in residential neighbourhoods with development fees being reduced. Outlined in **Figure 4** are the major land use areas in Selkirk identified in the Development Plan. **Figure 5** indicates where development is clustered and where future development by land use type ought to be accommodated.

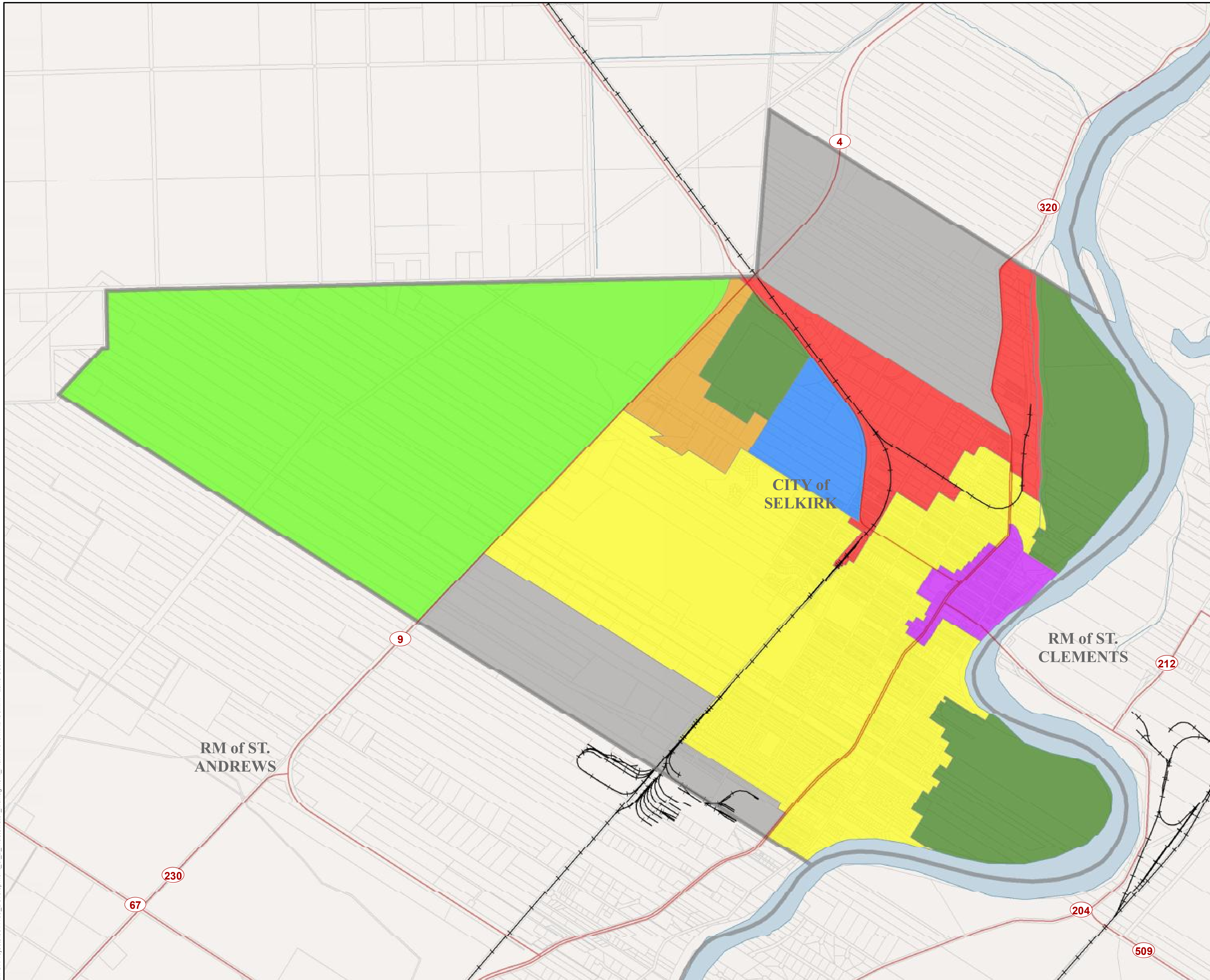
3.2 Twenty-Five Year Anticipated Population Growth and Land Use Patterns

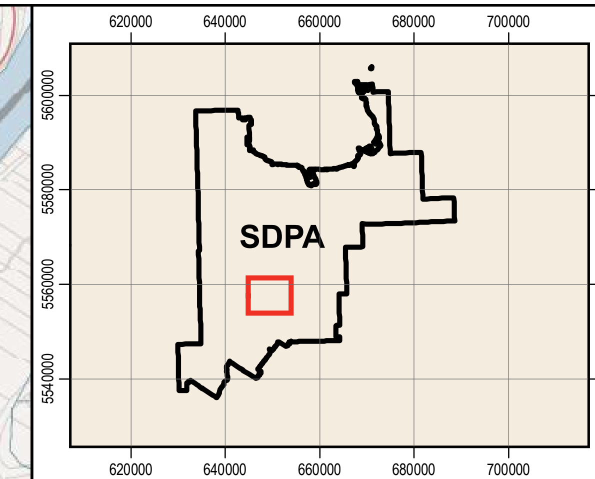
Selkirk has a 2011 population of 9,834, a 3.4 percent increase from 9,515 in 2006, equating to an average increase of 0.68 percent per year over the previous five-year period (Statistics Canada, 2011). Selkirk has seen some rather stable population numbers over the past decade, from slow growth to slow decline. Selkirk's wastewater system can support the level of wastewater generated as it has additional capacity.

In order to project the wastewater treatment needs of the community, three growth scenario options are presented: no, moderate and high growth. Selkirk's population has remained fairly flat since 1981 with a peak population of 10,037. Selkirk has not experienced major growth or decline in recent years and is not projected to see significant change in the near future. The three growth scenarios will be based on the following scenarios:

- No Growth - a zero percent will be used for this report's no growth population projection.
- Moderate - a 0.68 percent growth rate will be used for this report's moderate population projection, which reflects the growth over the last five years.
- High – a 2.42 percentage growth rate based on the 2010 Conference Board of Canada population projections for the Manitoba Capital Region (including Selkirk).

According to the Canada Census (2011), the average dwelling unit in Selkirk is occupied by an average of 2.42 residents, this is based on 4,062 dwelling units and 9,834 residents (9,834/4,062 = 2.42 persons per dwelling). However, it is important to note that there are several new apartment buildings currently under construction which may have a slightly less than average (2.42) number of persons per dwelling. Using the population statistics above in conjunction with the current number of dwelling units and the average number of residents/dwelling unit, Table 3 illustrates the anticipated rate of residential development over the short (5 years), medium (15 years) and long-term (25 years) durations and low, moderate and high growth population projections.





Wastewater Management Plan Guide Beta Test

Land Use

- Land Parcels
- Business Park
- Downtown Mixed Use
- Industrial
- Regional Commercial
- Regional Institutional
- Regional Recreation & Open Space
- Resource Land
- Urban Neighbourhood
- Land Parcels
- Rural Municipality
- Selkirk and District Planning Area

Land Base

- Road
- Rail Line
- Rural Municipality
- Watercourse
- Lake

Coordinate System: NAD 83, UTM Zone 14 N
Data Source: CanVec, ESRI, Prov MB, MMM Group
Date Created: January 6, 2012
Revision Date: April 30, 2012

0 250 500 1,000 Metres
0 500 1,000 2,000 Feet
N

Figure 4:
Selkirk Land Use Designations

MMM GROUP

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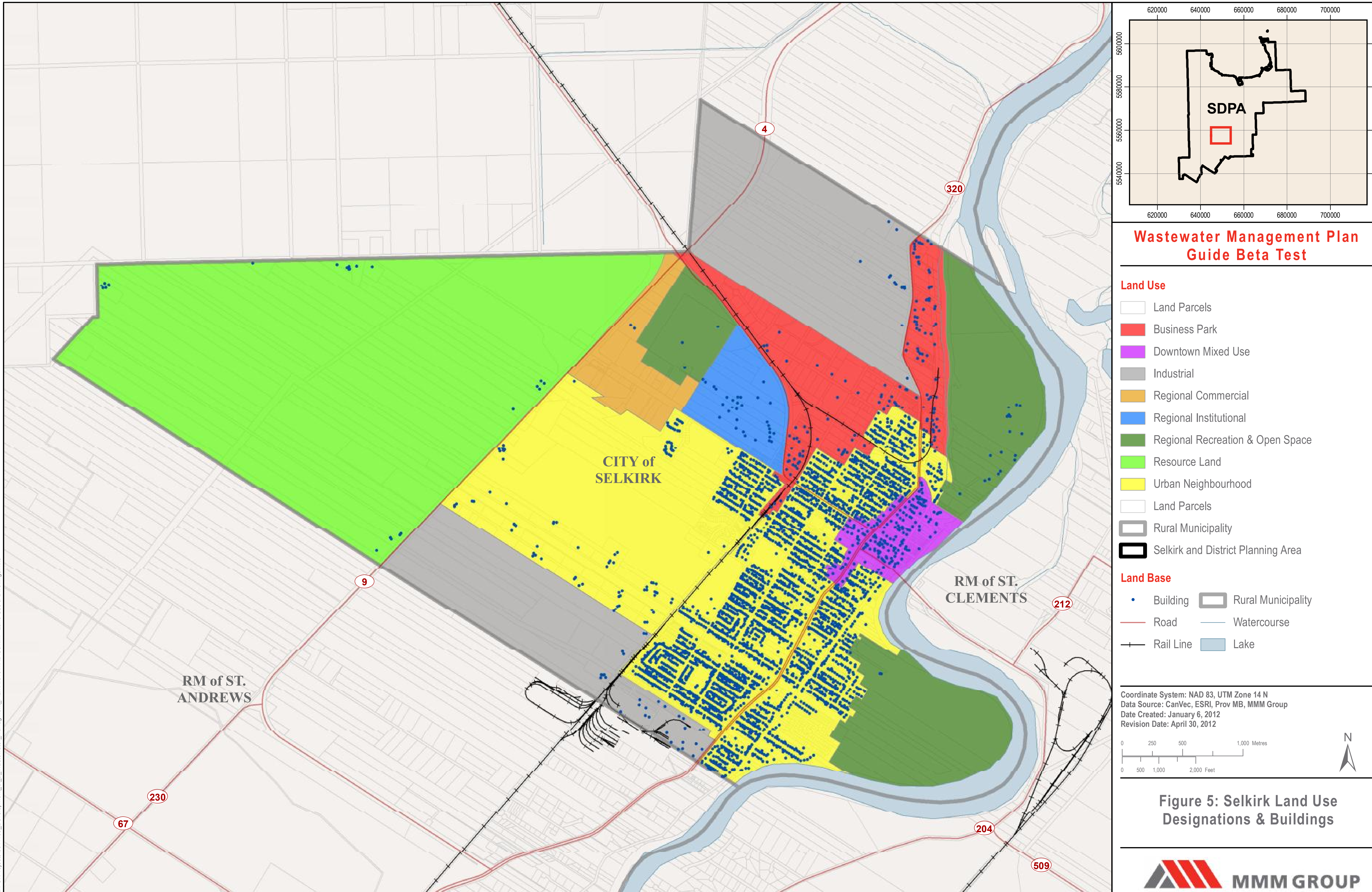

Figure 5: Selkirk Land Use Designations & Buildings

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Table 3: Growth Scenarios - Rate of Residential Development in Selkirk

	No Growth (0%)			Moderate Growth (0.68%)			High Growth (2.42%)		
Time Period	Population	Dwelling Units	New Units	Population	Dwelling Units	New Units	Population	Dwelling Units	New Units
2016 (5 Years)	9,834	4,062	0	10,173	4,204	142	11,083	4,580	518
2026 (15 Years)	9,834	4,062	0	10,886	4,498	436	14,077	5,817	1,755
2036 (25 Years)	9,834	4,062	0	11,650	4,814	752	17,879	7,388	3,326

Calculating the population and wastewater consumption to the projected growth rates, the WWTP can support the projected high level of growth over the next 25 years (based on 513 mL per capita per day). The WWTP has a maximum capacity of 34.1 mL/day and the capacity in each year is depicted under each growth scenario. These figures are well below the 34.1 mL/day capacity.

Table 4: Potential Daily Wastewater Generation (based on scenario growth rates)

Year	Wastewater Generated (mL per capita per day)		
	No Growth	Medium Growth	High Growth
2016	5.1	5.2	5.7
2026	5.1	5.6	7.2
2036	5.1	6.0	9.2

The 2012 AECOM report examined projections to the treatment system that assumed the R.M. of St. Andrews and the Lower Fort Garry National Historic Site would contribute wastewater to Selkirk's facility. The subject area for sewer coverage in the R.M. of St. Andrews is between the south boundary of Selkirk to PTH No. 44, from the Red River to generally PTH No. 9. The R.M. of St. Andrews population, associated with the area serviced, was expected to double from 132 residents to 264 residents. The Lower Fort Garry Historic Site would have limited capacity issues due to the type of tourism it offers and the seasonal nature of the facility. The R.M. of St. Clements was not included in this projection/scenario as they have recently initiated a wastewater treatment plant in the East Selkirk area. AECOM identified the future wastewater flows as follows in **Table 5**.

Table 5: Future Wastewater Flow Projections (Source – AECOM 2012)

Description	Selkirk [1]		St Andrews [2]		Lower Fort Garry [2]		Total - All Combined	
Year	2010	2029	2009	2029	2009	2029	2009/10	2029
Population	9,515	12,762	132	264	262	270	9,909	13,296
Average Flow (Lpcd)	518	518	387	387	49	49	504	506
Dry Weather Flow [3] (Lpcd)	418	418	270	270	49	49	410	413
AAF [4] (m^3/d)	4,929	6,611	51	51	13	13	4,993	6,762
ADWF [5] (m^3/d)	3,977	5,335	4,654	36	71	13	4,065	5,486
Harmon Peak Factor [6]	2.98	2.85	4.21	4.21	4.10	4.10	2.96	2.83
Peak Dry Weather Flow [7] (m^3/d)	11,837	15,197	150	150	39	40	12,026	15,529
Peak Rainfall Derived I&I [8] (m^3/d)	17,393	9,566	13	13	3	3	17,409	9,595
PWWF [9] (m^3/d)	29,230	24,763	163	163	42	43	29,435	25,125

Notes:

1 – Population, Average Flow (Lpcd) and Max Day Factor taken from Selkirk Historic averages in Table 2.2

2 – Population, Average Flow (Lpcd) and Max Day Factor taken from 2007 Study as well as the 2029 projection for Lower Fort Garry; 2029 projection for St. Andrews is double the existing population as advised by the City of Selkirk

3 – Dry Weather Flows are based on January, February and December and include dry weather infiltration

4 – Average Annual Flow is calculated using population and the historic average flow per capita

5 – Average Dry Weather Flow is calculated using population and the historic dry weather flow per capita

6 – Harmon Peak factor is a calculated value using the population of a community to predict the peak dry weather flows

7 – Peak Dry Weather Flow is calculated using the Harmon Peak Factor, the Dry Weather Flow per capita and the population

8 – Calculated using the historic Peak Flow to Plant for 2010 and then projected for Selkirk accounting for 25% of sewer separation completed in 2011 and assumes the City will complete a further 10 % separation of sewers every 10 years

9 – Peak Wet Weather Flow to Plant for Selkirk using maximum value from Table 2.2 for 2010 and for 2029 calculated using the sum of the Peak Dry Weather Flow and Peak Rainfall Derived I&I

3.1.1 Future Residential Land Use

Selkirk is supporting increased densities and infill development which is helping make the current wastewater system more efficient. The economic benefits of infill development include increased revenues from existing infrastructure, increases in land value, higher densities means more people closer to downtown to support local businesses, and new development replacing empty lots or dilapidated buildings encourages further investment by neighbouring property owners.

Selkirk could also accommodate servicing development from the surrounding regional communities. There are potential revenues for expanding the wastewater services to these areas as on-site wastewater systems have been commonly failing in the Red River corridor. The need for servicing is apparent however the costs to extend the services are high because the sewage is treated to a higher standard in Selkirk than what is found in rural settings. The cost for gravity fed sewer system is higher than low pressure sewer systems that the R.M. of St. Andrews has been exploring.

3.1.2 Future Commercial/Industrial Land Use

Selkirk's economic base consists of a range of commercial and industrial businesses. Over the past few years, Selkirk's economy has relied primarily on large-scale commercial developments (SDPA, 2011). Selkirk and the R.M. of St. Andrews are home to one of the larger steel mills in the prairies, Gerdau. Gerdau has its own wastewater treatment lagoon to treat manufacturing wastewater but has some office facilities serviced by Selkirk. There are some small metal fabricating and manufacturing firms but no industrial activities in Selkirk that use excessive water or generates wastewater of concern.

The locations and types of large-scale commercial businesses and areas that are designated for future commercial and industrial growth are depicted in **Figure 4**. There is land available to support additional industrial and commercial growth but Selkirk does not anticipate a large increase in demand on wastewater services from these sectors.

3.3 Future System Capacity

According to the SDPA Wastewater Servicing Plan (2010), future growth within Selkirk will be serviced by the existing WWTP. In order to increase the efficiency of the facility, Selkirk plans to upgrade the system and work toward eliminating the combined sewers through a sewer separation program. If this is achieved, flows to the treatment plant will consist of domestic sewage and rainfall dependent inflow and filtration. According to CH2M HILL (2007), "the surface flow from the rainfall will be removed and the plant wet weather flow will be reduced". This would certainly increase the capacity of the treatment system to accept a growing population fairly comfortably. However, there is little funding in the budget for the sewer separation program.

Another consideration is to assess the impact on the treatment system of the increased strength of wastewater to the WWTP as combined sewers are reduced. Wastewater is currently rather low or medium in strength as water from the combined system dilutes the wastewater. Higher wastewater strengths also may be experienced when water consumption is reduced (i.e. low flow toilets, shower heads, etc.).

Selkirk operates only one of two existing treatment "trains" because the second train is not required. The second train is maintained and ready to supplement the treatment of additional wastewater flows when required. There would be an increase in operating costs to run this second train.

3.4 Summary Observations and Recommendations

- Selkirk's wastewater treatment facility has the capacity to support a high growth scenario of 17,879 residents and 3,326 new dwelling units over the next 25 years.
- There is an abundance of lands available and designated for the various land uses and a significant area west of PTH No. 9 designated reserve lands to accommodate additional development.
- The WWTP will experience higher pollutant concentration in its wastewater as the system becomes separated and Selkirk should plan accordingly for the system to handle the higher strength of wastewater more regularly. However, the system is treating the wastewater during dry times rather effectively, which occurs more often than not.
- Separating the sanitary and storm sewers will improve the capacity of Selkirk to handle additional growth and better position Selkirk as providing a regional wastewater system.
- New regulations need to be met and require some significant WWTP upgrades and cost to Selkirk.
- Selkirk has the capacity to handle the anticipated external service area, which in turn would be a source of revenue for service upgrades.

4.0 WASTEWATER MANAGEMENT REQUIREMENTS

4.1 Wastewater Management Options (Existing System)

Selkirk has been open to the option of facilitating a regional wastewater system with its neighbouring areas; the R.M.s of St. Andrews and St. Clements. Wastewater from residential communities of East Selkirk and Two Mile Road located on the east side of the Red River in the R.M. of St. Clements was considered an option in the past. However, the R.M. of St. Clements has pursued a wastewater treatment facility on their own as there would be significant costs to cross the river. Discussion between Selkirk and the R.M. of St. Andrews has occurred in the past but no agreement has been implemented for a regional system (of a significant size).

Public Works and Government Services of Canada are responsible for the Lower Fort Garry National Historical Site and have had discussions with Selkirk to treat wastewater from their facility (south of Selkirk). An opportunity exists to extend a wastewater line to the Lower Fort Garry National Historic Site located in the R.M. of St. Andrews, as their wastewater facility is apparently in need of upgrading. If this is considered as an option, additional consideration should be made to service other developments between Selkirk and Lower Fort Garry. The added areas could generate funds to pay for the necessary upgrades to the Selkirk system.

The R.M. of St. Andrews is pursuing wastewater servicing for rural residents south of Selkirk along the PTH No. 9/Red River corridor because there has been a number of on-site septic system failures. The SDPA Development Plan has identified the need for future servicing to help intensify development in the area and would be a tool to help fund necessary infrastructure. The Red River corridor has been identified as problematic for on-site septic systems and much of the area is required to have holding tanks. Allowing new growth to utilize holding tanks will result in the need to increase the capacity of the local lagoons.

If a regional system is considered for the R.M. of St. Andrews (southwards) a low pressure sewer system has been identified as a cost effective regional collection system. Selkirk has indicated a concern with allowing the connection of a low pressure system due to the toxic off gases that are produced in the sewer line. These gases are corrosive to the pipes and treatment system and may result in significant maintenance costs in the future. Selkirk would require that a scrubbing process would need to be included in any connection to a low pressure system hook-up and the responsibility of St. Andrews. Selkirk prefers that any system that hooks into Selkirk's system is a gravity fed system, but this is more expensive to implement. Any connection for a regional system will need to connect directly to the WWTP, and not to the existing sewer connections or lift stations.

4.2 Wastewater Management (New Systems)

4.2.1 Community Scale

Selkirk has the capacity to accommodate additional wastewater immediately. This capacity will significantly increase if Selkirk can achieve full sanitary and storm water sewer separation. Balancing the technical requirements and issues with the costs of any future options of extending the system regionally is necessary to determine which option could be pursued. Coordinating support and interest for regional projects is needed by a third party such as the province of Manitoba. The R.M. of St. Andrews is exploring a regional system with West St. Paul and Stonewall. St. Clements has decided to construct a municipal wastewater facility in East Selkirk. There has not been any agreement set up with the Lower Fort Garry site. These are all matters that should be addressed coordinately.

Selkirk should assess any new individual industrial developments to ensure that the impact on water and wastewater infrastructure and the WWTP. Selkirk has capacity to accommodate new, or expansions of existing commercial, industrial, institutional, or any other large-scale developments but should understand the impacts it will have on the system.

4.2.2 Local Geography and Site Selection

The most logical regionalization of services would appear to be with parts of the R.M. of St. Andrews, in particular the area to the south of Selkirk and north of PTH No. 44. The option to extend services to Lower Fort Garry and service the rural area between Selkirk and Lower

Fort Garry seems like a logical place to explore the regional system. However, the R.M. of St. Andrews will need to evaluate this option also.

4.2.3 Technical Review and Evaluation

A new study of the options, cost and timing of a regional system should be conducted and involve the Province of Manitoba in the discussion as it pertains to the provincial government supporting a regional system. Selkirk may want to host a public consultation process with various options to get feedback from the public for the regional approach and generate interest for this option. Selkirk should explore and outline the costs for the services, capital costs for hook ups and the feasibility of servicing this area.

4.3 Improvements and Associated Costs

In 2007, Selkirk retained CH2M HILL to determine ways in which Selkirk could most effectively deal with future wastewater management, specifically in terms of required upgrades to the existing treatment plant. CH2M HILL evaluated five potential future wastewater treatment scenarios and developed a capital improvement plan that established a sewer hook-up rate schedule. Total costs associated with wastewater management (in terms of capital expenditures and wastewater treatment plant upgrades) were calculated and analyzed. The analysis and recommendations provided by CH2M HILL were intended to ensure that the City of Selkirk would not be responsible for subsidizing the costs, both short-term and long-term, of agreeing to treat additional wastewater flows from the regional community.

Three of the recommendations have been implemented:

- Closing the treatment facility to outside haulers.
- Not allowing BFI to dump leachate into the system.
- Starting a process for accommodating the new wastewater regulations.

There were two other recommendations that were not implemented that may have some merit.

- For the septage that is discharged to the lagoon, the actual cost to treat the wastewater and eventually land apply the solids should be incorporated as part of the charge to customers. In 2004, Selkirk was charging haulers $1.86/m^3$ of septage, whereas studies performed for other communities (CH2M HILL, 2007) have shown that the actual cost to treat septage is in the range of $25/m^3$. Therefore, the actual cost to dispose of septage in Selkirk should be determined, however full cost recovery would seem very high to the users of the system. Selkirk recently increased the rates for truck haulers but still does not reflect the actual cost of the treatment.
- Selkirk should reduce their combined sewer overflows and peak flows to the plant by sanitary sewer separation, land drainage detention/retention ponds or high rate treatment. This is an ongoing program.

5.0 IMPLEMENTATION AND FINANCING

5.1 Implementation Possibilities

Selkirk has allowed extensions of the sanitary sewer lines outside its boundaries to individual developments in a manner that would not lead to expanded capacity requirements for the WWTP. It may not be worthwhile to explore regional opportunities until the combined sewer separation program is more advanced. There needs to be an assurance that the treatment facility will have the capacity to treat the wastewater without increasing the occurrence of emergency releases. This can occur if the combined sanitary system is addressed or if the appropriate engineering calculations are conducted to ensure the extended wastewater volumes can be treated.

The area that seems to have the most possibility is to extend the services to the south of the City to capture the residential infill opportunities in the R.M. of St. Andrews. This could also incorporate the need to receive wastewater from Lower Fort Garry National Historic Site. Selkirk should assess whether the trunk lines have the capacity to serve the area to the south or whether a new trunk line and lift stations are needed from the treatment plant.

A significant challenge with this regional system seems to be the cost of extending an “urban” system to a “rural” area. The gravity fed system is more costly than a low pressure system and the large front end costs of incorporating the sewer infrastructure is a limitation. Further study should be conducted comparing the cost/benefits of both systems.

5.2 Projected Costs and Financial Obligation

5.2.1 Short-Term Costs

There is wastewater related capital projects scheduled within the five-year capital plan in Selkirk which includes sanitary sewer expenditures of $470,340 in 2014.

Expenditures are expected for upgrades required to comply with new wastewater regulations. The AECOM, 2012 report has outlined three options (and estimated costs) for Selkirk to consider that should reduce the nitrogen and phosphorous to acceptable levels. Further discussion with the Province needs to occur to confirm the nitrogen removal requirements for Selkirk before a decision can be made on what option to pursue. The exact Costs were not available at time of printing.

- Option 1: Modified Ludzack-Ettinger (MLE) Process.
- Option 2: Biological Nutrient Removal (BNR) Process.
- Option 3: Sequencing Batch Reactor (SBR) Secondary Treatment (three stage approach).

Selkirk will need to prepare and submit a nutrient removal implementation plan to the Province of Manitoba by January 1, 2013.

5.2.2 Long-Term Costs

If combined sewers were eliminated, the potential increased capacity could accommodate a significant population base. Further study on the long-term costs will need to be completed for the facility and the lines for any regional options that are considered.

5.2.3 Financing Methods

Selkirk has explored a number of financing methods for the wastewater system that serve their needs and has been innovative in developing financing programs that support infill development. However, Selkirk may want to consider an additional method. The gas tax allocation could be an option to pay for some of the capital costs required to separate the combined sewers, especially if a regional approach is being implemented.

If regionalization occurs, a financing mechanism will need to be agreed to that ensures all costs are recovered by Selkirk. Challenges to get the support from adjacent municipalities to join a regional system because the costs are high and the development is low density, compared to Selkirk. Selkirk's system is gravity fed and more sophisticated and costly than the systems typically used in the rural areas.

Depending on the phosphorous and nitrogen removal process Selkirk decides to take, will require some level of funding support from the Province of Manitoba.

6.0 CONCLUDING OBSERVATIONS

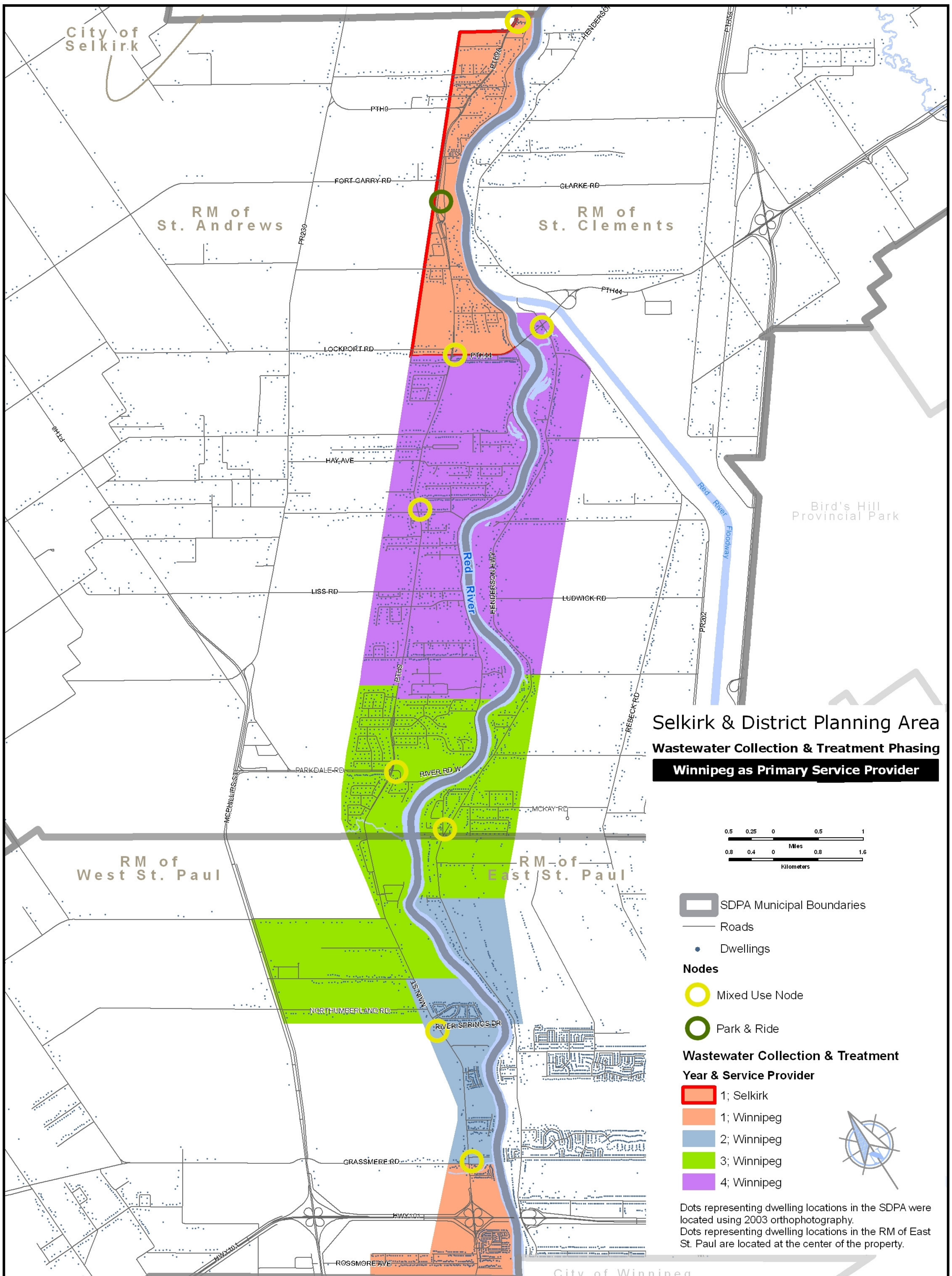
Selkirk does not have a capacity issue with its wastewater treatment system. It is however being challenged with the costs of becoming compliant with the new wastewater treatment provisions that will come into effect in 2016 for nitrogen and phosphorous reduction.

Selkirk is supportive to expanding their wastewater services regionally as there is capacity available to accommodate additional development. The system could also support the growth within its boundaries, especially as the combined sewers are separated. The regional option will need to reflect a fair cost but be done in a manner that the City would not subsidize the regional system in any way. There appears to be a need for a neutral third party coordinating body to facilitate and evaluate a regional system between the regional partners.

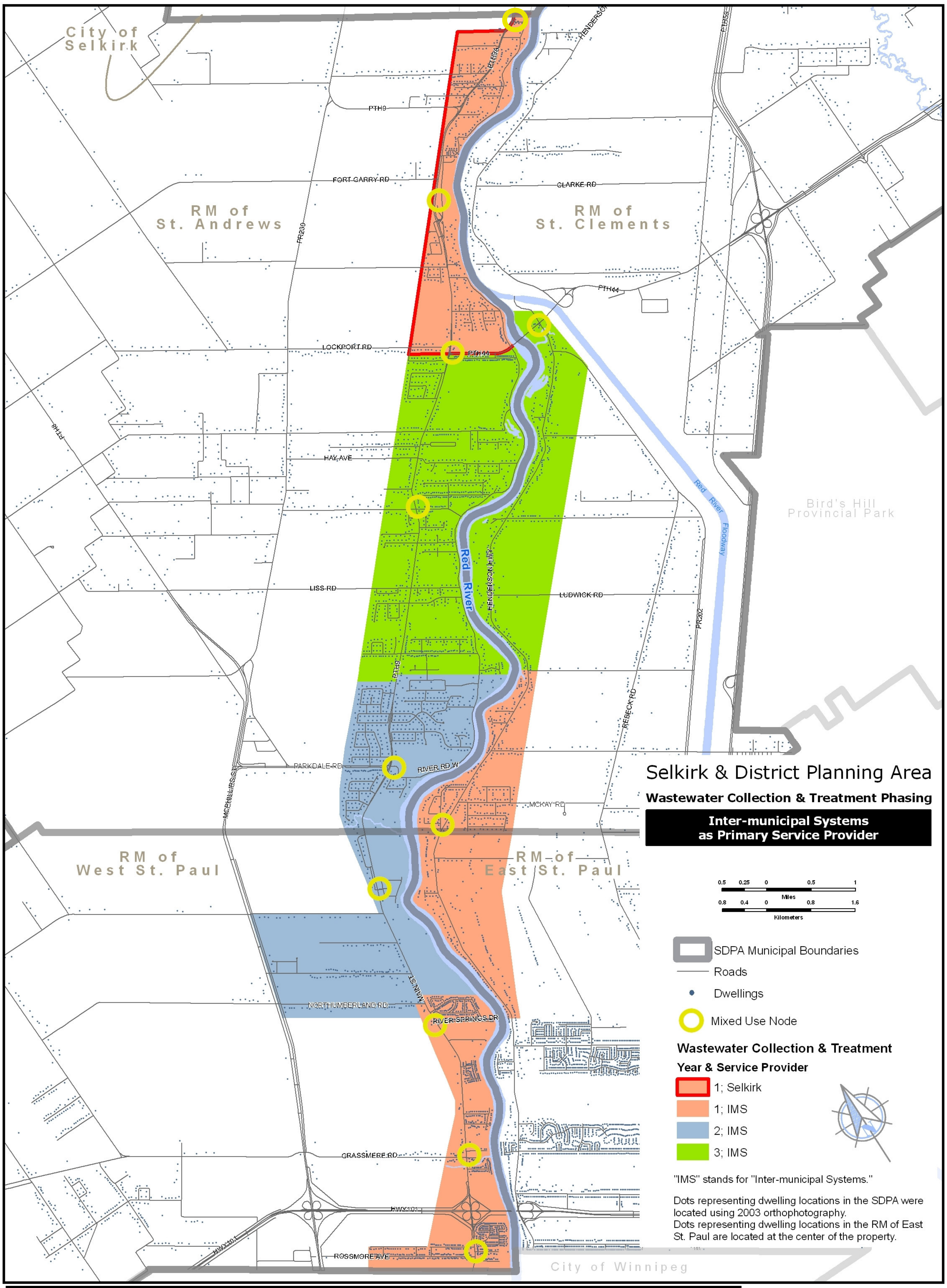
Regional system could assist Selkirk with paying for infrastructure improvements by charging new users an initial connection fee. The fees could be directed to capital costs to the existing wastewater system (treatment plant upgrades, sewer separation projects, etc.). This would free up capital dollars that could be allocated to other local projects.

The planning implications of servicing adjacent residential development may compete with Selkirk attracting residential development within its boundaries. However, much of the area south of Selkirk is already planned for more intensive and dense residential development (through infill). Whether Selkirk services the area to the south or not, will not change the intent St. Andrews has to intensify residential development in the area. St. Andrews may find another option for wastewater services to this area and the increased development will still be accommodated here. Although, connecting to the Selkirk system seems to be a logical option and would be a financial benefit to the City.

APPENDIX A - Maps 15 and 16



Waste Water Collection and Treatment Phasing
Map 15 - Winnipeg Option



Waste Water Collection and Treatment Phasing
Map 16 Inter-municipal Option