TOWNSHIP OF WELLINGTON NORTH
CLASS ENVIRONMENTAL ASSESSMENT

SERVICING MASTER PLAN UPDATE

COMMUNITY OF MOUNT FOREST

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TOWNSHIP OF WELLINGTON NORTH
CLASS ENVIRONMENTAL ASSESSMENT

SERVICING MASTER PLAN UPDATE

COMMUNITY OF MOUNT FOREST

March 15, 2011

B. M. ROSS AND ASSOCIATES LIMITED
206 Industrial Drive
Mount Forest, ON N0G 2L0
Phone: (519) 323-2945
Fax: (519) 323-3551
www.bmross.net

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TABLE OF CONTENTS

Table of Contents cont'd

LIST OF FIGURES

LIST OF TABLES

Table of Contents cont'd

APPENDICES

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 • f. (519) 524-4403
www.bmross.net

File No. 08158

TOWNSHIP OF WELLINGTON NORTH
CLASS ENVIRONMENTAL ASSESSMENT
FOR A
WATER SUPPLY AND SANITARY SEWAGE COLLECTION
MASTER PLAN UPDATE

COMMUNITY OF MOUNT FOREST

1.0 INTRODUCTION AND BACKGROUND

1.1 Background

The Mount Forest Water Supply and Sanitary Sewage Collection Master Plan study completed in December 2003 was to serve as an investigation of:

1) the water supply and distribution system, with particular emphasis on the water storage and trunk water distribution components, and
2) the sanitary sewage collection and pumping requirements in Mount Forest over a 20-year planning period.

The study was also carried out to set out a framework for providing water supply and sanitary sewage collection facilities to areas designated for future development including neighbouring areas in adjacent municipalities.

The primary purpose of the Master Plan was to allow the integration and coordination of new services to the expanded municipal service area with a reasonable basis for cost allocation. The purpose was further to allow the coordination of water and sanitary sewage works within the existing service area with other on-going municipal infrastructure needs such as the reconstruction of existing roads.

During the initial stages of the study the time horizon was expanded to 50 years to capture long term servicing needs as well.

Much of the background information in this report is unchanged since the previous study.

1.2 Purpose of the Study

One of the primary recommendations of the 2003 Master Plan study was that the plan should be reviewed and updated, as necessary, at a minimum of five year intervals. The following update study is being undertaken in response to the passage of more than five years and the completion of several of the works identified in the 2003 report. This study will also meet a need for updated information upon which to base further discussions related to servicing of lands in adjacent municipalities.

1.3 Integration of the Study with the MEA Class EA Process

The Master Plan Update study is being carried out in accordance with the Municipal Class Environmental Assessment (Class EA) document, as prepared by the Municipal Engineers Association, dated October 2000 (as amended in 2007). The study addresses the first two phases of the Class EA planning and design process. The tasks associated with Phases 1 and 2 of the Class EA planning process generally include the following:

- Identification of the problem or opportunity.
- Collection, review and analysis of data.
- Communication with relevant government agencies, municipalities, the public and interested parties about the problem and possible solutions.
- Identification and evaluation of all solutions and alternative designs prior to determining the recommended solution.
- Identification of potential impacts and mitigating measures.
- Organization and participation in public information meetings for all interested groups.
- Confirmation of a preferred solution.
- Definition of the preferred strategy in a Master Plan document.

Upon completion, the Master Plan Update document will be the basis for, and will be used in support of, future investigations for specific Schedule B and C projects identified within it. Schedule B projects would be required to fulfill the consultation and documentation components of Phases 1 and 2 of the Class EA process. Schedule C projects would be required to fulfill Phases 3 and 4 of the Class EA process and file an Environmental Study Report for public review.

1.4 Study Location and Service Area

The former Town of Mount Forest is located at the northern limit of Wellington County and was amalgamated along with the former Village of Arthur and Townships of West Luther and Arthur to form the Township of Wellington North in January 2000. Mount Forest straddles the intersection of Provincial Hwy. No. 6 and Provincial Hwy. No. 89 and is bisected by the South Saugeen River which runs roughly east to west through the southern portion of the community.

In 1999 Wellington North annexed a portion of the former Township of Egremont (now Southgate) located on Mount Forest's northeastern border. These lands are currently planned for future industrial development. The Township has also carried out discussions with the Township of West Grey on Mount Forest's northwestern boundary for a similar annexation. In addition to servicing the proposed lands to be annexed, discussions include the provision of services to lands retained by West Grey adjacent to the new municipal boundary.

Figure 1.1 illustrates the general location of the Township of Wellington North and the community of Mount Forest.

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MUNICIPALITY OF WEST GREY

TOWNSHIP OF SOUTHGATE

Mount Forest

TOWN OF MINTO

TOWNSHIP OF WELLINGTON NORTH

0 750 1,500 3,000 4,500 6,000 Metres

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TOWNSHIP OF WELLINGTON NORTH

SERVICING MASTER PLAN UPDATE

GENERAL LOCATION PLAN

DATE	PROJECT No.
JAN 14, 2011	08158
SCALE	FIGURE No.
As Shown	1.1

1.5 Study Area Description

As described in the 1991 Official Plan "Mount Forest is a medium sized town located in the northern limits of Wellington County and surrounded by significant agricultural resource area." The plan further notes that the town contains a "broad range of residential, commercial, recreational and employment opportunities." This description continues to be appropriate as there is still a significant variety of business and industry and also of housing and retail commercial outlets for a town of this size.

One objective of the Official Plan is "To promote a compact, pedestrian oriented downtown". The Official Plan also identifies other objectives as the provision "of serviced industrial lots which can be made available to new industries without undue delay" and "To ensure industrial development is properly served by a full range of municipal services". These objectives all provide direction in terms of the future planning of municipal servicing.

According to the 2006 census Mount Forest had a total population of 4,490 housed in 2,064 private dwellings giving a density of 2.18 persons per household (pph). The area of the town is identified as 8.28 square kilometers. This indicates a relatively low density of 5.4 people per hectare due to the large areas of undeveloped land and predominance of single family and low rise medium density dwellings as opposed to higher density dwelling units within the boundary of the former town.

1.6 Physiography

Mount Forest is located on the western portion of the Dundalk Till Plain which is characterized by Chapman and Putnam[1] as a gently undulating till plain with low drumlinoid swells. This is part of the highest portion of southern Ontario and receives among the highest rainfalls. Mount Forest itself lies largely on a spillway formation intersected by shallow till ridges and nearby to gravel eskers to the northeast and southeast. The overall fall of the land in Mount Forest is from east to west but the southern part of the community is crossed from the east to the southwest by the relatively deeply cut, up to 20 m. in some locations, South Saugeen River Valley. While drainage on the south side of the river is generally towards the river, the fall of land north of the river continues to the west and there are a number of localized low and high areas which interfere with the general drainage pattern. The existing water tower is located on a localized high area approximately 25 m. above the normal river level and less than 300 m. north of the river. Other unusual topographical features have led to the recent installation of deep sewers near the river in the area of the former Sewage Treatment Plant. Soils in the Mount Forest area have been identified as variable with significant gravel deposits interspersed with deposits of heavier soils such as silt and clay.

[1] The Physiography of Southern Ontario, 3rd edition, L. J. Chapman and D.F. Putnam, Ministry of Natural Resources, July 1984.

1.7 Existing Servicing

Mount Forest is currently serviced by a municipal water system, comprised of four drilled bedrock well supplies; a 2,080 m^3 elevated storage facility (standpipe) and a water distribution network. Upgrades to the water system since completion of the 2003 Master Plan study included a booster pumping station at the storage facility, looping of supply mains and the replacement of undersized mains in some locations.

The sewage system consists of a sewage collection pipe network including four municipal sewage pumping stations (SPSs) and a new extended aeration sewage treatment plant which discharges to the South Saugeen River. Works carried out since the last study have included the construction of the new treatment plant at a location further downstream, on the southwest edge of town, and the conversion of the former treatment plant into a high flow detention storage facility and sewage pumping station. This has also included the replacement of a portion of the trunk sewer leading to the former treatment plant and construction of a major forcemain from the former plant to the new plant to carry all of the sewage flow. Infrastructure upgrading of the central commercial business area of Main Street was also carried out including the replacement of some water and sewer piping and separation of storm services from the sanitary sewage system.

There are also two private sewage pumping facilities serving the OPP station on Highway 6 at the north end of the Town and an industrial plaza in the northwest portion of Town. Capacity issues with the Cork St. SPS and with the Durham St. SPS have led to current projects for their replacement. Construction of the new Cork St. SPS has recently been completed while the new Durham St. SPS is currently under construction.

The general locations of the water supply and storage facilities and of the sewage pumping stations and treatment plant are presented on Figure 1.2.

N

MUNICIPALITY OF WEST GREY

MOUNT FOREST

6

Well #5

Well #6

Well #4

Well #3

PERTH ST. SPS

DURHAM ST. SPS

CORK ST. SPS

MAIN SPS

Existing standpipe and booster pumping station

SEWAGE TREATMENT PLANT

INDUSTRIAL

FOSTER

DURHAM

HENRY

ELGIN

KING

JOHN

WATERLOO

WENDYS

CHURCH

EGREMONT

FERGUS

WELLINGTON

LONDON

KING

KENZIE

CORK

PRINCESS

DUBLIN

NORTH WATER

SOUTH WATER

MELISSA

MARTIN

MILL

BENTLEY

Legend

- Water Storage
- Well Supply
- Existing SPS

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

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TOWNSHIP OF WELLINGTON NORTH

SERVICING MASTER PLAN UPDATE

Existing Water and Sanitary Facilities

DATE	PROJECT No.
Jan 14, 2011	08158
SCALE: As Shown	FIGURE No. 1.2

1.8 Problem Identification

During the previous evaluation of service facilities a number of known shortcomings in the existing water and sanitary sewage systems were identified. These included insufficient water flows to meet fire protection standards in some locations, insufficient water storage to meet emergency conditions and problems with sewer system capacity during wet weather. A concern was also identified with the number of sewage pumping stations required due to the topography of the community.

It was noted that many of the proposed new services would have long service lives and that meeting the needs of only the next 20 year period would mean that some facilities could be under sized before their service life was complete. For this reason the planning time frame was expanded to 50 years for much of the proposed works. Further, the plan was to include a reasonable basis for the allocation of servicing costs to future users of the works. In view of this and the stated requirements for the Master Plan, to provide a plan for servicing future development, the previous Master Plan Problem Statement was identified as,

Develop a water supply and sanitary sewage servicing plan for the existing and future development areas of Mount Forest that will allow the integration and coordination of new services with other on-going municipal infrastructure needs within the existing service area and to the expanded municipal service area over the next 50 years with a reasonable basis for cost allocation.

It is felt that this problem statement is still appropriate for the current Master Plan Update. To meet these requirements the Master Plan Update study will investigate a range of alternatives, where possible, to correct current issues and to serve future servicing needs. An evaluation will be carried out of the alternatives, including possible mitigating measures, and a preferred alternative will be selected for each item of work.

2.0 SUMMARY OF THE 2003 MASTER PLAN STUDY

2.1 General

The 2003 Master Plan study for the Water Supply and Sanitary Sewage Collection System for Mount Forest was carried out to allow the coordination of water and sanitary sewage works within existing and future servicing areas. The unusual topographic features of the study area particularly affect possible drainage patterns, sewage pumping requirements and the location of additional water storage. Exceptionally high groundwater flows at the site of the new sewage treatment plant also had a significant impact on the sewer alternatives that were considered to be practical. The 2003 Master Plan was carried out in accordance with the MEA Class Environmental Assessment process for Master Plans so that projects arising from it had completed Phases 1 & 2 of the Class Environmental Assessment.

2.2 Public Consultation

Public consultation represented an integral part of the Master Planning process. During the study, a consultation program was implemented to obtain input on key study issues from the general public, government review agencies, and key stakeholders. Information gathered through this process was incorporated into the analysis of future servicing needs and the evaluation of servicing alternatives. The consultation program included a public notice and public meeting, circulation of a project summary and request for input from review agencies, and the circulation of an information package and telephone interviews with local developers, contractors, and builders.

2.3 Population Growth Analysis

In 2003 Mount Forest contained 365 ha of existing and available infill development area with a 2001 population of 4,584 housed in 1,882 residential units. It contained a healthy industrial-commercial sector with good growth potential provided that adequate servicing would be available. The annexation from Egremont Township and the anticipated annexation from West Grey Township, both on the northerly municipal boundary, along with the commitment to service additional developed lands in West Grey and additional potential development lands around the current developed area, provided an added 560 ha. of potential development and servicing area.

A review of historic growth patterns and analyses led to the selection of a population growth factor of 1.2% and expected increases in population of 29% over 20 years and 77% over 50 years. Residential, industrial and commercial servicing requirements were anticipated to increase by the same amounts over these periods. Institutional growth demand was anticipated to be less as many of the basic institutional needs were already in place.

Following discussions with municipal authorities and local developers' future growth and servicing requirements over the next 50 years were allocated within the available lands for use in assessing future servicing needs.

2.4 Water Supply, Storage and Distribution

At the outset of the 2003 Master Planning process, four wells and a water storage standpipe served Mount Forest. The firm supply capacity of the well system (available supply with the largest well out of service) was 74.9 L/s and the maximum day demand over the previous years was 52.4 L/s. There was an excess of supply over demand of about 43%. The volume of effective storage in the standpipe was 1,000 m^3 and the calculated storage requirement including fire flows was 2,600 m^3. The anticipated storage requirement to meet the 50 year service projection at that time was 5,000 m^3.

The computer analysis of the Mount Forest water supply and distribution system indicated that, due to the lack of storage, presence of undersized distribution watermains and a number of dead ends on the pipe system, there were numerous areas of the community which could not be provided with the target flows to fight fires under specific demand conditions.

A number of possible solutions to these problems were evaluated and it was identified that a combination of a booster pumping station at the existing standpipe and additional elevated storage in the proposed new development lands at the north end of the community should be undertaken. It was recommended that the booster pumping station be constructed immediately and the additional elevated storage be implemented as part of any extension of the water distribution system.

A number of upgrades to the water distribution system were identified to be carried out as soon as possible and as part of normal road and infrastructure remediation activities. The 2003 estimated cost of these works was:

Proposed Watermain Upgrades and Extensions	$ 730,000
Standpipe Booster Pumping Station	$ 450,000
Trunk Watermain, Existing System to new Elevated Tank	$ 400,000
New Elevated Storage Tank - 3,000 m^3	$ 1,550,000

Cost sharing for the new elevated storage tank and connecting trunk watermain was proposed to be carried out on the basis of serviced land area during the design life of the facilities. Additional trunk watermain requirements to meet future land development needs, including an added watermain crossing of the South Saugeen River were also identified. These works would be carried out as required to meet future demand and would typically be at the cost of the developer.

2.5 Sewage Collection

The Mount Forest sewage collection system received extremely high levels of inflow and infiltration which historically caused sewage backups into basements and by-passing of the sewage treatment plant. Based on numerous studies the problem was located primarily in the older central areas of the community. Peak flows which should have been in the order of 75 L/s to 100 L/s were estimated to be in the order of 215 L/s to 300 L/s.

A partial solution to the overflow problem was the construction of a new sewage treatment plant and the conversion of the original sewage treatment plant for use as storage for excess peak flows and as a sewage pumping station to direct flows to the new plant.

A review of the sewage pumping stations indicated that the Durham St. SPS and the Cork St. SPS were undersized to deal with the theoretical flows to them. It was identified that the Cork St. SPS was operating well below the theoretical flow level. Both sewage pumping stations were identified as requiring significant capacity expansion and needing to be replaced to meet the 50 year design requirements. Two additional sewage pumping stations were identified to be needed in the vicinity of Coral-Lea Dr. and Nor-Park Dr., and Bristol St. and South Water St. to transmit sewage from the northerly and southerly development lands into the sewage collection system.

Several alternative methods of transmitting sewage to the new sewage treatment plant were evaluated. These included the redirection of some flows directly to the new sewage treatment plant and avoiding contributing to the sewer capacity problems on Arthur Street. The works undertaken since completion of the study include increasing the size of the Arthur St. sewer. Provision has also been made for a forcemain connection to the new forcemain at the intersection of Martin Street and Cork Street to permit a future bypass of the main sewage pumping station with some future flows.

All three alternatives contained a requirement for inflow and infiltration remediation so that facilities would not need to be oversized to meet the added demands that these excess flows impose.

2.6 Cost Sharing

Part of the information requirements for the 2003 Master Servicing Plan was the development of a rationale for cost sharing with West Grey for the new infrastructure facilities required to service the lands retained by them within the service area. The sharing of costs was limited to new facilities to be built specifically to include for future needs of the West Grey lands and did not include any existing facilities such as the water supply wells or sewage treatment works.

For cost sharing of water facilities the valuation included the construction of the trunk watermain extension from the existing distribution system and the new elevated water tank, not including any allocation of site cost for land already owned by the municipality. The major sewage facility which could be attributed in part to West Grey development was the proposed sewage pumping station at Coral-Lea Dr. and Nor-Park Dr. and the associated forcemain. The value of the sewage pumping station and forcemain used was exclusive of land, depending on the forcemain routing selected.

Proportional benefit was estimated for both the 20 year and the 50 year development timeframe. In view of the current high proportion of development of the West Grey lands it was assumed that the whole 29.8 ha. of designated development in West Grey would be fully developed for industrial uses for the calculation of cost sharing.

For the purposes of the water works there was estimated to be 65.6 ha. of benefiting lands in the 20 year time frame of which the West Grey lands are 45.4%, and 139.2 ha. of benefiting lands in the 50 year time frame of which the West Grey lands are 21.4%. For the purposes of the sewage works there was estimated to be 46.9 ha. of benefiting lands in the 20 year time frame of which the West Grey lands are 63.5%, and 90.0 ha. of benefiting lands in the 50 year time frame of which the West Grey lands are 33.1%.

2.7 Recommendations

The 2003 Master Servicing Plan identified specific works required to meet needs over the following 50 years as well as a number of policy and program recommendations. These included:

1. Begin detailed planning for water main projects to increase fire protection capability:

    - Construction of a booster pumping station at the existing standpipe location.
    - Construction of additional elevated storage at a site in the lands to be annexed from the Twp. of West Grey and associated trunk watermain works.

2. Begin detailed planning for the construction of a new expanded Durham St. SPS including the selection and purchase of a suitable site.

3. Begin detailed planning for the construction of a new expanded Cork St. SPS including the designation of a suitable site.

4. Complete topographic mapping for all areas where mapping is not currently available. Current topographic mapping should be reviewed and updated as necessary.

5. Develop a formal program of watermain upgrades within the existing serviced area to ensure that the necessary works are carried out within a reasonable timeframe.

6. Adopt a policy of constructing all new watermains with a minimum diameter of 150 mm unless site specific investigations establish that a smaller diameter is feasible. Establish a program to upgrade existing watermains less than 150 mm in size.

7. Consider undertaking a Master Drainage Plan. A remediation of storm drainage issues may help in the reduction of inflow and infiltration to the sanitary sewer system.

8. Develop a formal policy to allow allocation of capital costs to both existing and proposed developments.

3.0 REVIEW OF DEVELOPMENT STATUS

3.1 General

In order to determine what works will be required and where they will be needed a growth and development evaluation has been carried out for the next 20 and 50 year periods. Appendix A contains a detailed review of the nature of development and population growth in the Mount Forest area, with an emphasis on growth trends since completion of the 2003 Master Plan. The report also updates the land requirements needed to accommodate the projected growth in the community over the defined 20 year and 50 year planning periods, based upon the current land use planning framework. The following is a summary of this work and its conclusions.

3.2 Development Background

The Development Review was carried out based on current Official Plan and Zoning By-Law documents of Wellington and Grey Counties and land use data of Statistics Canada. Significant new sources, since the 2003 Master Plan was carried out, were the Population, Housing and Employment Forecast Update prepared by C.N. Watson & Associates (2008) and the Township of Wellington North Comprehensive Review of Residential and Employment Growth (2009) report prepared by the County of Wellington Planning and Development Department.

These latter two documents represent significant changes to the planning direction for the study area to meet the prescribed requirements of the Growth Plan for the Greater Golden Horseshoe (Growth Plan); a key initiative of the Places to Grow Act (2005).

As noted previously Mount Forest can be characterized as a small urban centre which incorporates a strong industrial base, a higher-order commercial sector and a low-density residential setting. The Growth Plan aims to curb urban sprawl and to encourage intensification over the Toronto centred region of Southern Ontario. The result of this is to project significantly increased growth rates for Mount Forest over the next 20 years. These goals and objectives have been incorporated into the County of Wellington Official Plan.

At present there are approximately 2,070 residential units in Mount Forest of which roughly 65% are low density, single or semi-detached homes, and 28% are apartments. There has been a significant increase in the proportion of row house units constructed in recent years.

Commercial development in Mount Forest consists basically of a downtown business core along Main St. between Queen St. and Sligo Rd., and two areas of Highway Commercial development, on Hwy. 6 at the north end of town and on the westerly portion of Queen St.

There is a significant amount of industrial development in Mt. Forest situated primarily in the northwest part of the community. Considerably more land is designated for this purpose in the same area, extending to the northeast as well.

3.3 Review of Development Potential

Key development trends that have been identified include:

- There will be a gradual increase in overall residential densities through redevelopment in existing residential areas.
- There will be increased construction of medium density residential developments.
- New residential growth is anticipated to be concentrated in the London Road area and areas south of the South Saugeen River.
- Highway commercial development is expected to expand north and south along Hwy. 6.
- Industrial expansion is expected to be gradual and to occur generally within existing areas and extending northward.

Approximately 550 ha. of land has been designated in the Official Plan, including the current 365 ha. of developed land, to accommodate growth. Table 3.1 identifies the amounts of land designated for each land use. Figure 3.1 shows how it is distributed.

Table 3.1
Designated Land Use Activities in the Study Area*

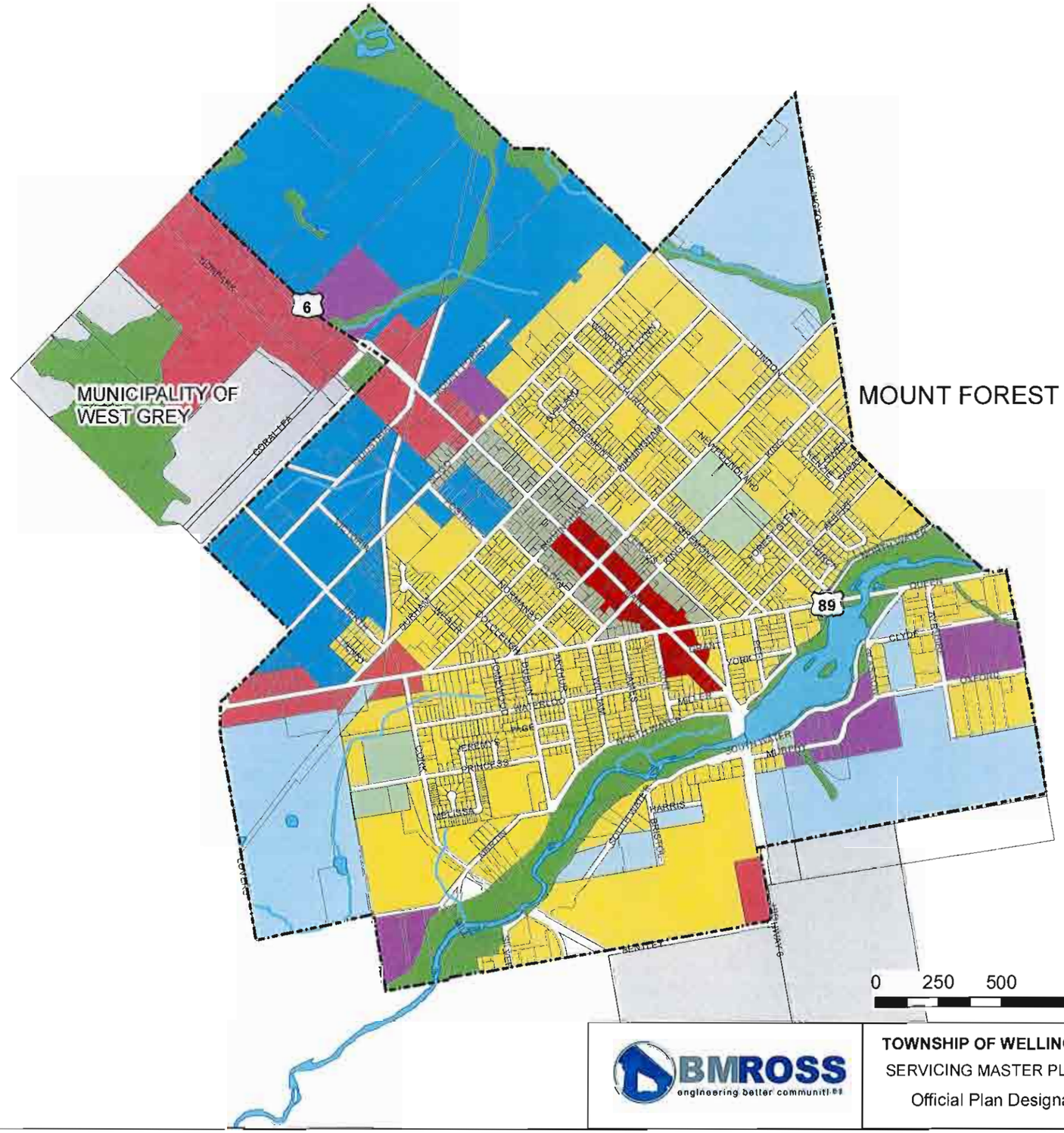
Land Use	Land Base (% of Total)*
Residential	273.1 ha (29.9%)
Residential Transition Area	18.1 ha (2.0%)
Central Business District	10.4 ha (1.1%)
Highway Commercial	61.9 ha (6.8%)
Industrial	162.4 ha (17.8%)
Policy Area	21.2 ha (2.3%)
Future Development	120.4 ha (13.2%)
Recreational	14.3 ha (1.6%)
Agriculture	127.0 ha (13.9%)
Core Greenland	105.9 ha (11.6%)
Total	914.7 ha (100%)

3.4 Growth and Development Projections

Residential

Historic 5 year average population growth rates have ranged from – 0.41% to + 3.49% over the period from 1976 to 2006 and the average population growth over the entire period has been 0.95%. During that same period household densities have decreased steadily from 2.59 persons per household (pph) to 2.33 pph and the number of households has increased at an average annual rate of 1.45%.

N



Legend

- Urban Centre Boundary
- Mount Forest Parcels (selection Set)
- Core Greenlands
- Policy Area
- Industrial
- Highway Commercial
- Residential Transition Area
- Residential
- Recreational
- Regulatory Floodline
- Central Business District
- Future Development
- Agriculture

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Official Plan Designations

DATE	PROJECT No.
Jan 14, 2011	08158
SCALE: As Shown	FIGURE No. 3.1

Based on the requirements of the Growth Plan for the Greater Golden Horseshoe the Population, Housing and Employment Forecast Update projects that the population growth rate over the period ending in 2031 will increase to average 1.91% per annum and the number of households will grow by 1.87% a year. The projected household density will increase to, and be maintained at, 2.50 pph.

For the purposes of the 50 year projection for this Master Plan Update it is assumed that growth rates will decline beyond 2031 to approximately 0.60% per annum by 2061, which is consistent with growth rates over the last 15 years. Household density has been assumed to remain at 2.50 pph over the entire period. On this basis the population is projected to increase by 60% over the next 20 years and by 124%, to 10,650, over the next 50 years, with similar increases in the number of households, to 4,260 in 50 years. The average growth rates over the entire 50 year study period will be 1.50% per annum for population and 1.45 % for households.

In order to develop a forecast of future land needs for residential uses a number of assumptions were made. These include:

- Residential development patterns and consumer preferences (location and housing type), identified in the Comprehensive Review of Residential and Employment Growth, will remain constant over the study period.
- The rate of intensification within existing residential areas will increase to 20% of new building each year by 2021 and remain constant throughout the balance of the projection period.
- Residential lands which are not currently subject to the planning process by way of plans of subdivision or other planning constraints will be assumed to develop at 16 units/ha.
- Specific rates of uptake of land have been identified for lands within the Built Boundary and within the larger Urban Boundary, with no land designated Future Development being developed until all land within the Built Boundary is taken up.

Based on this it is anticipated that 29 ha. of land will be needed for residential development outside of the Built Boundary within 20 years and 103 ha. of land will be needed for this purpose within 50 years. This includes lands that are currently designated for residential activities and lands designated for future development.

Employment

The Comprehensive Review of Residential and Employment Growth was used as the primary source for forecasting the amount of land required to accommodate future employment. The review highlighted the following information:

- The methodology used was independent of population growth statistics and used other factors to predict employment growth and development requirements.
- During the period from 2006 to 2031 there will be 1,890 new jobs created in Wellington North including 673 industrial positions and 423 commercial jobs. The balance of jobs created would be home based, primary industries or building contractors which would not require additional employment lands.

- Assumed employment densities of 23.5 jobs/ha. and 33.4 jobs/ha. were used to project land needs of 28.6 ha. for industry and 12.7 ha. for commercial growth up to 2031.

For the projection of this data to serve for the 50 year analysis several additional assumptions were made:

- Mt. Forest is assumed to receive 70% of the future industrial development and 65% of the future commercial development predicted for Wellington North;
- Employment growth will be consistent over the entire 50 year planning period;
- Employment densities will also be consistent over the entire planning period.

The result of this analysis was that for Mount Forest alone, over the 50 year period, there will be an increase of 942 positions in the industrial sector and an additional 550 jobs in the commercial sector. The land requirements to accommodate this growth will be 40.1 ha. of industrial land and 16.5 ha. of commercial land.

Future Land Needs

Table 3.2 summarizes the land requirements outside of the existing serviced area to meet future residential, industrial and commercial development needs.

Table 3.2
Summary of Additional Land Requirements for the Study Area*

Land Use	2031	2061
Residential	29 ha	74 ha
Industrial	16.1 ha	24 ha
Commercial	6.6 ha	9.9 ha
Total	51.7 ha	107.9 ha

** Lands required outside of the existing service area.*

3.5 Future Service Areas

Existing development in the Mount Forest service area has been subdivided into four Sanitary Drainage Catchment Areas (SCA) defined for the three original sewage pumping stations and one area that currently discharges to the new sewage pumping station, constructed at the former Sewage Treatment Plant, by gravity. These areas include lands within the Built Boundary as well as lands that have not yet been developed or serviced and have been designated as,

SCA – 1	Perth Street SPS	6.5 ha.
SCA – 2	Cork Street SPS	134.5 ha.
SCA – 3	Durham Street SPS	159.5 ha.
SCA – 4	Main SPS (former STP)	185.8 ha.

Table 3.2 outlined the future additional land requirements outside of the existing serviced area to accommodate growth-related activities in the study area. Given the need to provide municipal services to future development in an orderly and cost-effective manner, a plan was prepared for the 2003 Master Plan designating future growth areas based on future requirements for sanitary sewage and water servicing, as well as future land use activities. In total, 10 Future Service Areas were identified for this study area. These areas were defined based on an evaluation of land use planning policies and future sanitary sewage requirements (i.e., anticipated drainage catchment areas). Figure 3.2 illustrates the lands situated within each of the defined areas.

The following updates the estimated land base required in each area to accommodate future development activities over the 20-year and 50-year planning periods. Information regarding the approximate size of future service areas was updated from the 2003 Master Plan. The land base projections presented in Table 3.3 provide a general conception of future growth activities in the community. The forecasts are not definitive in nature and are only used to assist the preparation of long-term servicing plans for water supply and sanitary sewage collection.

Table 3.3
Additional Land Requirements for Future Service Areas

FSA	Total Area	Land Use	2011-2031	2031-2061	Total
IA	38.4 ha	Industrial	21.5 ha	6.1 ha	27.6 ha
		Residential	4.4 ha	0 ha	4.4 ha
IB	93.4 ha	Industrial	0 ha	70.6 ha	70.6 ha
		Highway Commercial	6.1 ha	0 ha	6.1 ha
2A	41.2 ha	Industrial	6.1 ha	3.2 ha	9.3 ha
2B	15.4 ha	Industrial	6.1 ha	0 ha	6.1 ha
3	47.1 ha	Highway Commercial	0 ha	0 ha	0 ha
4A	47.2 ha	Residential	13.5 ha	13 ha	26.5 ha
		Highway Commercial	3.6 ha	0 ha	3.6 ha
5	61.1 ha	Residential	0.4 ha	18.5 ha	18.9 ha
6A	15.7 ha	Residential	0 ha	4.3 ha	4.3 ha
		Highway Commercial	3.2 ha	0 ha	3.2 ha
6B	51.4 ha	Residential	0 ha	3.6 ha	3.6 ha
		Highway Commercial	0 ha	3.6 ha	3.6 ha
7A	44.0 ha	Residential	2.6 ha	12.3 ha	14.9 ha
7B	20.1 ha	Residential	9.1 ha	9.8 ha	18.9 ha
8	70.5 ha	Residential	0 ha	12.9 ha	12.9 ha
		Highway Commercial	3.3 ha	0 ha	3.3 ha
9	6.8 ha	Industrial	0 ha	0 ha	0 ha
10	9.7 ha	Residential	6.6 ha	0 ha	6.6 ha
Total	**562 ha**		**86.5 ha**	**157.9 ha**	**244.4 ha**

N

MUNICIPALITY OF WEST GREY

MOUNT FOREST

1B
1A
7A
6
3
7B
2A
2A
2B
2B
89
9
5
8
10
4A
6A
6B
4B

Legend

- Urban Centre Boundary
- Built Boundary
- Mount Forest Parcels (selection Set)
- Future Service Area

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

BMROSS engineering better communities

TOWNSHIP OF WELLINGTON NORTH

SERVICING MASTER PLAN UPDATE

Future Service Areas

DATE	PROJECT No.
Jan 14, 2011	08158
SCALE: 1: 18 000	FIGURE No. 3.2

WATER SUPPLY, STORAGE AND DISTRIBUTION

4.1 Background

Mount Forest is currently serviced by a municipal water system comprised of four drilled bedrock well supplies, a 2,080 m^3 elevated storage facility (standpipe) with booster pumping station, and a distribution network. The general locations of the supply and storage facilities are presented on Figure 4.1.

Wells four and six are equipped with lineshaft turbine pumps, and wells three and five are equipped with submersible turbine pumps that discharge directly into the distribution system. All well supplies are being disinfected using a sodium hypochlorite solution.

System controls, select monitoring and select record keeping functions are automatic, using a Supervisory Control And Data Acquisition (SCADA) system.

Well pumps are controlled (start/stop) automatically based on standpipe liquid levels.

The Mount Forest water system services a permanent population of approximately 4,750 (2006 estimate). Based on recent utility records, the water system customer base is comprised of about 1,916 residential premises and 186 ICI premises. The municipal water system is also used for fire protection.

Some developed areas within the town boundaries are currently not serviced by municipal water, including:

- Some residential properties in the southeast area of town, south of the Saugeen River and Hwy. #89 and to the east of Hwy. #6.
- Residential and commercial properties on Sligo Road, east of Church Street (northeast corner of town).
- Egremont Township annexation area (north end of Mount Forest, east side of Hwy. #6).
- Residential properties at the west end of Bentley Street (southwest corner of town, south side of the Saugeen River).

A detailed evaluation of the water supply system was described in the Mount Forest Water Works Engineers Report in November 2000 and a number of recommendations were made. Subsequent to this the Ministry of the Environment (MOE) issued an amended Certificate of Approval (C of A) in November 2002. All works described in the amended C of A have been completed.

In December 2003, a Master Plan was completed for the Mount Forest water supply and sanitary sewage collection. The Master Plan provided a number of recommendations relating to proposed upgrades to the water supply system in order to address deficiencies that were identified at that time. Since 2003, the following upgrades have been carried out or are in progress:

- Construction of a booster pumping station at the standpipe location
- Upgrades to Well Nos. 3, 4, and 6
- Watermain construction/replacement in several locations, including:
  - Industrial Drive watermain extension
  - Egremont watermain replacement, Queen Street to Durham Street
  - Main Street watermain construction, Industrial Drive to Coral Lea Drive and Birmingham Street to Queen Street
  - Albert Street watermain construction to London Road, and London Road watermain construction from Albert Street to existing watermain on London Road
  - Durham Street, east of Elgin Street to Main Street
  - Birmingham Street, Church Street to the east
  - Irwin Lytle Drive, Sligo Road to the north
  - Princess Street, Cork Street to the west
  - Cork Street, Queen Street to Waterloo Street
  - Additional crossing of the Saugeen River
  - Other 150 mm diameter watermain construction, or replacement in various road reconstruction projects

4.2 Historical Water Supply Information

Well Supply Capacity

The rated and actual capacities of the municipal water supply are shown in Table 4.1. The rated capacity is the capacity as permitted under the Permit to Take Water (PTTW) for each of the wells. The actual capacity is the flow rate at which the pumping equipment is currently set to run. Well No. 6 has been throttled by means of a valve on the discharge line in order to reduce the flow because of high sulphide levels which have been experienced when the discharge rate is higher. Well Nos. 4 and 5 are also throttled in order to ensure that the maximum per minute pumping rate, as per the PTTW, is not exceeded as the pump discharge spikes when called to operate. Historically, Well No. 3 had been throttled by means of a valve on the discharge line in order to prevent operational issues that have been experienced at higher flow rates. In December 2010, rehabilitation work on Well No. 3 was completed, and preliminary observations indicate that the rehabilitation work has successfully increased the actual capacity of the well. It is suggested that further operation and observation of this well be carried out in order to confirm the actual capacity. The firm capacity of the well supply system is considered to be the capacity when the largest well supply is out of service as may happen from time to time.

Table 4.1
Capacity of Mount Forest Water Supply System

Well No.	Rated Capacity[1]	Actual Capacity[2]
3	22.7 L/s (1,920 m^3/d) @ 71.3 m. TDH	21 L/s[4]
4	22.7 L/s (1,920 m^3/d) @ 83.2 m TDH	16.3 L/s
5	45.5 L/s (3,849 m^3/d) @ 69.5 m TDH	35.26 L/s
6	45.5 L/s (3,849 m^3/d) @ 92.7 m TDH	25.1 L/s
Total	136.4 L/s (11,785 m^3/d)	91.66 L/s
Firm Capacity[3]	90.9 L/s (7,854 m^3/d)	62.4 L/s

Notes:
1. As per the Permit to Take Water.
2. As per the throttled discharge rate at present.
3. Equal to total well supply capacity with the largest supply out of service.
4. Reported actual capacity based on preliminary observations following December 2010 rehabilitation.

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MUNICIPALITY OF WEST GREY

MOUNT FOREST

Well #5

Well #6

Well #4

Well #3

Proposed elevated tank site

Existing standpipe and booster pumping station

6

89

WENDYS

CHURCH

LONDON

KING

GOWER

SARAH

ALBERT

INDUSTRIAL

FOSTER

DURHAM

BIRMINGHAM

FERGUS

WELLINGTON

QUEEN

ELGIN

WEBER

HENRY

WATERLOO

ARTHUR

WILLIAM

JAMES

JOHN

NORTH WATER

SOUTH WATER

CORK

PRINCESS

DUBLIN

MELISSA

MARTIN

MILL

BENTLEY

LEGEND

- Water Storage
- Well Supply
- Existing Watermain
- Future Watermain
- Urban Center Boundary

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

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TOWNSHIP OF WELLINGTON NORTH

SERVICING MASTER PLAN UPDATE

PROPOSED WATER INFRASTRUCTURE

DATE	PROJECT No.
JAN 14, 2011	08158
SCALE	FIGURE No.
As Shown	4.1

Water Demand

Table 4.2 provides a summary of the combined system well pumpages in Mount Forest over the three years from 2007 to 2009 inclusive.

Table 4.2
Mount Forest Water Works
Average and Maximum Day Pumpages 2007 - 2009

Month	Monthly Average Day Pumpages (m^3/d)			
	2007	2008	2009	Avg.
Jan.	1,385	1,483	1,324	1,397
Feb.	1,601	1,435	1,426	1,487
Mar.	1,566	1,399	1,360	1,442
Apr.	1,677	1,490	1,264	1,477
May	1,680	1,485	1,316	1,494
June	2,085	1,621	1,384	1,697
July	1,736	1,617	1,422	1,591
Aug.	1,822	1,518	1,375	1,571
Sept.	1,721	1,661	1,410	1,597
Oct.	1,616	1,492	1,355	1,488
Nov.	1,546	1,364	1,347	1,419
Dec.	1,513	1,300	1,316	1,376
Annual Average	1,662	1,489	1,358	1,503
Maximum Day	3,469	2,011	1,748	
Max. Day Factor	2.09	1.35	1.29	

NOTES:
1. At least one day of data is missing for the months of January and April 2007, April 2008, and September 2009.

Based on the 2006 population of 4,750 people and the average daily pumped flow of 1,503 m^3/d the average water use in town, including industrial/commercial/institutional (ICI) uses, is 316 litres per capita per day (lpcd). This is within the MOE design criteria of 270 – 450 lpcd. At the time of the 2003 Master Plan, average water use in town was estimated to be 477 lpcd. Based on comments from Township staff, the decrease in per capita water usage may be a result of several factors, including:

- Closing of several industries
- Increase of base rates for metered water users
- Elimination of discounted rates for water usage above specific volumes
- Increase in the number of metered users
- Introduction of restrictions on water use for lawns
- Improved maintenance protocols

Flows to all major ICI users have been metered in recent years and Table 2.4 in Appendix B gives a summary of these uses for 2009. Based on this metering information ICI use is estimated to be approximately 6.26 L/s, which is equivalent to 540 m^3/d or approximately 35% of the total demand. The actual water usage rates for ICI customers vary over an extremely large range and average values are very much affected by the distribution of usage rates amongst users. In order to compensate for this a weighted average approach has been taken to evaluate usage. Rates for use in the model were then selected based on engineering judgement following a comparison of the various averages with MOE design guideline values.

It is noteworthy that,

a. There are only 3 of 14 industrial users with demands greater than 15 m^3/ha/d, with the top user at 23.8 m^3/ha/d. The remaining 11 of 14 users all use less than 4 m^3/ha/d. The MOE Guidelines propose a range of 35-55 m^3/ha/d.

b. The average of total commercial usage divided by total commercial land area is approximately 14.7 m^3/ha/d. Eliminating the 52 commercial users using less than 100 m^3/year, the average is 22.7 m^3/ha/d. The MOE Guideline is 28 m^3/ha/d.

c. Institutional usage rates vary widely with users such as the school board, health/nursing care being significantly greater than churches, etc.

Based on the well pumpage records, the Maximum Day flow demand in 2007 was 2.09 the Average Day requirement. This is close to the MOE design criteria of 2.0 for a system of this size. For distribution system analysis purposes, the MOE design criteria of 2.0 was used.

It is a design requirement that the basic water supply source, the Mount Forest well system, must have a firm capacity that is at least equal to the Maximum Day water demand.

The Maximum Day flow during the period of record is 3,469 m^3/d in 2007, or 40.2 L/s, which represents approximately 64% of the firm supply capacity. Based on a growth rate of 1.91% per annum for the next 20 years, and current usage rates, the wells have capacity to meet system supply needs for approximately 23 years in the future.

Further expansion of the metering system to all users would typically be expected to reduce overall water usage and particularly to reduce usage during Maximum Day and Peak Demand periods. Metering every user would also allow the system to be monitored for possible losses due to leakage. The existing wells would have capacity to meet supply needs beyond 23 years if the actual capacity of each well was increased to the permitted capacity.

4.3 Water Supply and Distribution

Water Storage

Storage is a significant component of the water supply and distribution system. The MOE Design Guidelines for Water Storage require storage to include volume for fire protection, flow equalization (peak demand) and emergency conditions. The formula they provide is,

Storage = A + B + C

Where A = fire storage (based on fire flow requirement for a specific population)
B = equalization storage (25% of maximum day requirement)
C = emergency storage (25% of A + B)

Fire flow requirements are based on a fire flow requirement for the entire system for various population levels as defined by tables in the MOE guidelines and have been established for the current population and for the projected 50 year population. This fire flow volume is strictly for calculating storage requirements and is different from the specific fire flow for different land uses that is used in water supply and distribution models.

Distribution System and Computer Modeling

In order to evaluate current and future water supply needs at the time of the 2003 Master Plan, a computer model of the current water supply, storage and distribution system was prepared. For the 2011 Master Plan update, the water model was updated to include current water supply capacities, current existing and projected water demands, and all works that have been constructed since 2003. Appendix B contains the details of how this water modeling exercise was carried out. The model consists of a numeric representation of the pipe system based on the length of pipe between intersections, pipe diameter and pipe roughness based on the pipe material and age of the watermain. Pipeline intersections are called nodes, or junctions, and it is at the nodes that certain levels of flow, depending on surrounding land uses and fire requirements, are introduced, and available flow rate and pressure are calculated. The model also contains input points to represent flow into the system from the wells and water storage facility. Observations of static pressures throughout the distribution system, measured by Township staff in 2008, were used to verify that the model is calibrated properly.

The model was used to evaluate current water supply system operating conditions and also to predict the requirements for water system expansion to meet future development needs. Various flow requirement scenarios were used to determine the worst case demand conditions on the system. The scenarios commonly used to test this requirement are Maximum Day flow demand, Peak Rate (or maximum hour) flow demand and Maximum Day plus fire flow. Each of these scenarios represents a different duration of flow requirement and a different level of flow over that period.

The MOE Design Guidelines call for specific pressures to be available during various demand conditions. A pressure range of 350 kPa – 480 kPa (50 psi – 70 psi) is considered to be acceptable for normal flow conditions with a minimum pressure of 275 kPa (40 psi). Maximum pressure should not exceed 700 kPa (100 psi) at any time to avoid leakage, damage to appliances, etc. The minimum allowable pressure, which applies to maximum day plus fire flow conditions, is 140 kPa (20 psi). In order to achieve these pressures in normal distribution systems providing fire protection a minimum pipe size of 150 mm. diameter and the looping of pipe networks to avoid "dead-ends" is called for by the MOE.

Peak demand rates for a system of this size are normally in the order of 3.0 times the average day flow rate requirement for a period of one hour and are dealt with by a combination of water supply and water storage.

Fire flow requirements are based on density of development and type of land use, and vary both in terms of volume and of duration. For the community of Mount Forest, fire flows of 50 L/s (660 gpm) for two hours were used for residential development, 150 L/s (2,000 gpm) for two hours for ICI development and 225 L/s (3,000 gpm) for two hours for downtown commercial development. Fire flows are tested by imposing the Maximum Day demand across the entire system and then imposing specific fire flows at various locations within the system. Fire flow requirements are typically provided from water storage and the MOE Design Guidelines include storage requirements for both Peak Flow and Fire Flow components.

4.4 Evaluation of Analytical Results

Water Storage

Appendix C contains the calculation of water storage requirements for the Mount Forest Water Supply System based on the current (2011) and projected 50 year (2061) populations and flow data.

The current water storage requirement for Mount Forest is 2,400 m^3 of effective storage. The current effective storage of the standpipe and booster pumping station is in the order of 2,000 m^3 (1,000 m^3 of effective storage in the standpipe without the booster pump operating). Therefore, there is a current shortfall in storage availability. Some of this shortfall can be assumed to be made up by the excess supply capacity, however this is not sufficient to meet all possible needs that may arise including the need for major fire protection.

Projecting the water storage requirement for a 50 year design period indicates that the water storage need at that time will be approximately 5,000 m^3. The Maximum Day flow requirement at that time is projected to be 6,394 m^3/d or 74.0 L/s which exceeds the current firm water supply capacity. Using the current effective storage capacity and assuming that additional water supply sources are developed to meet the projected Maximum Day demand there would be a requirement for a further 3,000 m^3 of effective storage at that time.

Water Distribution

Appendix B contains the detailed results of the computer modeling analysis of the water supply and distribution system for both the current development and anticipated future development conditions.

The system analysis for current development shows that the existing distribution system is capable of supplying adequate volumes of water to all areas of the community during normal demands up to the peak demand rate, at acceptable or close to acceptable pressures. The exception to this is the area immediately adjacent to the standpipe, and to the east/northeast of the standpipe, where pressures are only in the 290 kPa to 350 kPa range during average day and maximum day demand periods.

The analysis of Maximum Day plus Fire Flow requirements imposed on the current distribution system indicates that there are some locations throughout the existing system that cannot supply the target fire flow due to inadequate pipe sizing and lack of system "looping", including a number of residential areas where 50 L/s cannot even be achieved. Since the time of the 2003 Master Plan, several upgrades to the water distribution system have improved available fire flow to many locations in town, including the downtown commercial core. Appendix B contains a representative list of the locations where insufficient flow rates and pressures would currently be expected during worst case conditions.

4.5 Possible Solutions

Water Storage

As noted above there is currently a shortage of approximately 400 m^3 in the effective storage available to meet peak demand, fire fighting and other emergency needs. Furthermore this shortfall is projected to grow to approximately 3,000 m^3 in the 50 year planning period. Ideally, future additional storage would be located at the opposite end of the distribution system from the current storage location. This would minimize the need to upgrade transmission mains to carry high flows from storage to new development areas. Standpipes are considerably less expensive to construct than elevated tanks but are limited in terms of their "effective" storage. One of the issues of concern in addressing the storage situation is the topography of Mount Forest and the fact that there are no points of equal elevation to the current standpipe site in the proposed industrial development lands to the north where high flows would be needed. The highest points within the northerly development lands are a minimum of 9 m lower than the current standpipe site. With the current standpipe already 33 m tall and practical limitations to the height of standpipes it is therefore recommended that storage in the north part of the future system would need to be in the form of an elevated tank.

As part of the 2003 Master Plan, a number of alternative solutions for meeting the future storage requirements were considered:

1) remove the existing standpipe and construct a new increased size elevated tank on the same site.
2) divide the system into two zones approximately north and south of Sligo Road and construct a new standpipe or ground level reservoir on the northerly annex lands.
3) construct a new storage facility suitable to maintain a single pressure zone across the entire municipality.

Alternative 3 was identified as the best choice for meeting future storage requirements. This alternative is still considered to be the preferred option. In summary, the reasons that the other alternatives are not preferred include:

- Alternative 1 would be extremely difficult and costly in terms of construction, and would leave many customers in town without fire protection during the demolition and construction period. Aesthetically, this option is undesirable. Additionally, a booster pumping station was constructed at the existing standpipe site in 2007, therefore it would not be logical to remove the standpipe.
- Alternative 2 would create a low pressure zone north of Sligo Road. This option would provide limited storage to support flow requirements south of Sligo Road. Based on current and anticipated future needs, this option is not considered to be acceptable.

By using a booster pumping system to increase the available effective storage at the current standpipe it would be possible to construct a new storage facility of approximately 3,000 m^3 in the northerly development lands and achieve a relatively good balance of storage throughout the distribution system.

The 2003 Master Plan identified the future industrial development lands at the north end of town as the preferred location for a future storage facility. Construction of the facility in this location could take place in an unconfined site on lands currently owned by the municipality. These lands are clear and well drained and do not represent any significant social, natural or technical impacts. An archeological screening would need to be carried out to ensure that there were no heritage impacts involved in construction at this location.

Water Distribution

As described in Appendix B, in general the current problems regarding the provision of adequate fire flows relate to areas where 100 mm diameter watermain is installed and the fact that there are several dead ends in the current distribution system. Figure 2.2 in Appendix B shows the locations where adequate fire flow cannot currently be achieved. The possible solutions to resolve the current system shortcomings are to:

1) replace undersized piping
2) eliminate the dead ends by constructing additional watermain to complete looping of the distribution system
3) combination of 1) and 2)

Many of the current dead ends exist because of incomplete development in various areas on the outskirts of the town and will be improved as development becomes more complete. All future development should be based on the use of a minimum size of watermain of 150 mm. There are some areas within the town where future development will not resolve an existing dead end and consideration should be given to looping the water main in these locations now. As well as evaluating the need to complete the distribution network it may be necessary to upgrade some of the undersized water main in order to achieve a distribution system that meets fire flow requirements in all areas. Specific recommendations in this regard would require a trial of the model with piping added to complete loops in several locations.

4.6 Future Distribution Requirements

Flow requirements for the Future Service Areas have been developed based on the growth assessment described in Chapter 3 and demand assumptions identified in Appendix B. Demand for the future scenario is based on current demand requirements with the exception that new commercial development average flows are set at 28 m^3/ha/d, in accordance with MOE Design Guidelines. The MOE Guideline value was used because the average of metered user demands is significantly reduced by the many small users, while the weighted average is considered unrealistically high because of one large user.

As part of the 2003 Master Plan, a network of trunk watermain extension was developed based on projected demands in Future Service Areas. Based on the demands that have been generated for each of the Future Service Areas as part of the Master Plan update, there is no significant modification to the trunk watermain extension requirements. Pipe sizes were selected and tested using the model to ensure that adequate flows and pressures could be provided. In several cases a variety of water main sizes were used depending on whether system looping were carried out or not and on alternative land uses that might finally be chosen where there is some uncertainty whether development will follow current designations.

Storage has been assumed to consist of an effective capacity of 2,000 m^3 from the existing standpipe and booster pumping station, and a new elevated tank with an effective capacity of 3,000 m^3 located on the south side of Coral Lea Drive at a high point west of Hwy. 6. Operating pressures for the new storage facilities are assumed to be the same as the current operating elevations of the existing standpipe. The “firm” supply capacity of the system has been assumed to be the total capacity of the current wells. This would require that an additional well supply will need to be developed at some time in the future; consideration could also be given to investigating options for increasing the current capacity of existing wells to the rated capacity of the wells.

The result of this analysis is as follows:

- the proposed new elevated storage tank should be connected to the existing distribution in two locations:
  - construct a minimum 300 mm dia. watermain from the proposed elevated tank to the existing 300 mm dia. watermain on Industrial Drive, south of Coral Lea Drive
  - construct a 400 mm dia. watermain from the proposed elevated tank, along Coral Lea Drive to Main Street, and from there construct a 300 mm dia. watermain to the existing 300 mm dia. watermain on Main Street
- pressures will continue to be slightly below the recommended values under average, maximum day and peak flow conditions for land adjacent to the existing standpipe and for lands at the east end of Albert St. due to the limited elevation of the water in the existing standpipe. This could be remedied by running the booster pumping system even during average day demand, but this would be unduly complex and the problem is not considered to be sufficient to require remediation in this manner.
- low pressures will exist to a greater extent in the southeast portion of FSA 5 and south of Murphy Street/South Water Street due to the high elevation of the lands in that area. An additional pressure zone using a booster pump would be required to supply adequate flows and pressures to this area.
- the 300 mm diameter watermain crossing of the river, constructed from the north end of Bristol Street to the south end of James Street, will require improvements to the connection to the existing standpipe in order to supply the volume of flow that would be required for commercial development south of the river. This connection could include the replacement of watermain, from the intersection of North Water and James Streets to the standpipe location, with a larger diameter watermain (note: design and approvals are complete for this work). Even if the lands south of the river are developed for less intensive uses, it would be a good idea to provide an increased supply capacity to the watermain crossing, for added security.

4.7 Scheduling

Based on the current shortfall of storage, even with the recently constructed booster pumping station, it is considered that additional water storage should be constructed in the near future and certainly as part of any distribution system extension to the north. Completion of the 300 mm dia. loop between the new storage and the existing distribution system should be considered at an early date to provide added security.

Upgrades to the existing distribution system in terms of increasing water main sizes from 100 mm to 150 mm and completion of unfinished system looping should be undertaken as the opportunity permits when other infrastructure replacement or additional land development within currently developed areas takes place. The upgrading of the watermain on King (Main to Queen) and Elgin (Wellington to King) Streets is specifically noted as an area that should have the small diameter watermain upgraded when opportunity permits, as calculated available fire flows in this area are below the target value. A larger diameter (i.e., 250 mm) on Elgin and King Streets, between Wellington and Queen Streets, would also provide the benefit of completing an additional large diameter loop between the existing and proposed storage facilities.

4.8 Estimated Cost

Appendix C contains detailed estimates of the costs of the proposed works.

Correction of Existing Problem Areas

The estimated cost of works to correct existing problems includes the proposed replacement of a number of sections of 100 mm watermain.

The watermain costs are estimated based on the reinstatement of the road structure over the trench only. In total, approximately 900 m of watermain ranging in size from 150 to 250 mm in size is included in the Table 4.3 summary recommended replacement areas.

Table 4.3
Mount Forest Water Works
Estimated Costs to Correct Existing Problems

Street	From	To	Construction Cost	Total Cost
Elgin	Wellington	King	$130,000	$265,000
King	Queen	Main	$135,000	
Peel	Queen	York	$120,000	$290,000
York	Peel	Queen	$170,000	
Total				**$555,000**

Increased Storage

The estimated cost to incorporate increased storage includes the construction of approximately 100 m of 300 mm dia. watermain on Main Street from Coral Lea Drive to the existing 300 mm dia. watermain on Main Street, and 470 m of 400 mm water main on Coral Lea Drive from Main Street to the proposed site of the elevated tank. The 400 mm water main sizing is based on meeting future fire demand requirements of the proposed industrial lands in FSA 1 and 2.

A cost estimate has been provided for an elevated storage tank of 3,000 m^3 capacity. The municipality owns land on Coral Lea Drive in a suitable location for the elevated tank so no cost has been included for the purchase of a site. The location of most of the system storage at the north end of the community could ultimately require upgrading of trunk water transmission mains connecting the storage to the lands south of the river should substantial development take place there as planned.

Future Requirements

The water main additions identified in Appendix B to meet future development needs are generally located outside of the existing service area and are representative of the anticipated requirements to be met as development takes place. In locations which are within or adjacent to existing service areas, the proposed watermain requirements should be considered when any other infrastructure and road work is being planned. No cost estimates have been prepared for those mains which will be designed to meet future development needs as funding of these works are anticipated to be a cost of development.

Summary of Costs for Water System Works

Proposed Water Main Upgrades and Extensions	$ 555,000
Trunk Water Main, Existing System to new Elevated Tank	$ 450,000
New Elevated Storage Tank - 3,000 m^3	$ 1,950,000
	$ 2,955,000

5.0 SEWAGE COLLECTION

5.1 Background

The Mount Forest sewage system consists of a sewage collection pipe network including four municipal sewage pumping stations and an extended aeration sewage treatment plant which discharges to the South Saugeen River. There are also two private sewage pumping facilities operating in the community. One services the regional police station on Highway #6 north of Industrial Rd. and the other an industrial plaza on Victoria St.

Historically, the sewage collection system consisted of three sewage pumping stations that carried flows from approximately 45% of the service area while the balance flowed by gravity to the sewage treatment plant. In 2008, the construction of a new sewage treatment plant on the north side of the river at the southwest corner of the Town was completed. All sewage flows directed to the old sewage treatment plant, referred to now as the North Water Street Sewage Pumping Station, are pumped to the new extended aeration sewage treatment plant.

In the past, there have been problems experienced with sewage backups in the existing sewer system and extremely elevated levels of inflow and infiltration have been reported. A critical component of the gravity sewer system that crosses a number of private residential properties just north of the former sewage treatment plant has been removed and replaced with 600 mm diameter sewer in the Arthur Street road allowance. This has alleviated backflow problems occurring previously.

Based on the proposed growth rate of 1.91% per annum sewage flows are anticipated to increase by over 60% over the 25 years beginning in 2006. The growth rate is then projected to decline somewhat resulting in a total growth of almost 125% by 2060. Much of this growth is anticipated to occur in the north and east areas of the town. Sewage from this future development

area has been designated to flow to the Durham Street sewage pumping station. These flows will need to pass through the existing gravity collection system to get to the North Water Street sewage pumping station. Analysis shows that there is adequate capacity in the existing gravity trunk sewers to accommodate 50 years of growth related flow, in addition to existing flows. A new sewage pumping station will be required to transmit sanitary drainage for the lands annexed from Egremont, and possibly West Grey. Sewage from these lands is anticipated to drain to the Durham Street sewage pumping station. There is currently no sanitary sewer servicing south of the South Saugeen River. In order to accommodate communal sewage servicing for the anticipated growth in that area, a sanitary sewer forcemain was installed beneath the South Saugeen River in 2006.

5.2 Works Completed Since 2003 Master Plan

Since the completion of the 2003 Master Plan a variety of projects have been completed or are currently underway to upgrade and expand the sewage collection system. Projects include:

- Sewer replacement and upgrades
- Construction of a new Sewage Treatment Plant
- Construction of new Cork St and Durham St Sewage Pumping Stations
- Conversion of the old Sewage Treatment Plant to a Sewage Pumping Station

In 2009, a Class EA was conducted for improvements to the sanitary sewage collection system. As a result of recommendations in that report the Cork Street sewage pumping station has been replaced by a new SPS at a different location on Cork Street. Construction of the SPS and required sewer and forcemain upgrades and additions were completed in 2010. Design of a new SPS to replace the existing station on Durham Street has been completed and construction is expected to be complete in mid-2011.

5.3 Historical Sewage Flow Information

5.3.1 Sewage Pumping Stations

The four sewage pumping stations and their drainage areas are described below.

Perth Street SPS

The Perth Street Sewage Pumping Station drainage area is designated as Sanitary Catchment Area (SCA) 1. The station is a submersible sewage pumping station located under Perth Street at the point where Industrial Drive would intersect if it were extended directly along its current path. This station was designed to serve an area of 12.3 ha adjacent to Perth Street between the municipal drain to the north and Sligo Road. It currently receives drainage from 7.1 ha containing light industrial operations. The Perth Street pumping station contains two submersible grinder pumps each with a capacity of 3.3 L/s at 35 m TDH. A 288 m long forcemain with a diameter of 50mm discharges to the gravity sewer at Sligo and Perth in the Cork St. SPS drainage area. The pumping station storage has been sized to accommodate pumps

capable of discharging at a rate of up to 20 L/s, following an upgrade of the discharge forcemain to 100 mm diameter. At the time of construction it was intended ultimately to replace the Perth Street Sewage Pumping Station with a sewer which would drain by gravity to the existing municipal sewage collection system to the south. Recent data on actual usage of this station is not available, however limited data from April, May and June 2003 indicated that the station pumped approximately 1.4 m^3/day on average at that time. It is not expected that this has changed significantly.

Cork Street SPS

The Cork Street Sewage Pumping Station drainage area is identified as SCA 2. It currently includes approximately 59.1 ha of land designated for residential, highway commercial and industrial uses. A new Sports Complex was constructed in 2009 and also discharges to the Cork Street SPS. A review in 2009 established that replacement of the facility was required. Construction will be complete in 2010. The rated capacity of the existing station is 35.5 L/s. The replacement SPS is located on the west side of Cork Street on the unopened Waterloo St. ROW south of the existing SPS. This new station has been designed to serve an area of 83.9 ha. The new Cork Street SPS contains 2 submersible pumps each with a capacity of 67 L/s at 24.3 m TDH. The pumps are equipped with Variable Frequency Drives which permits them to operate at lower rates of flow. Sewage from the SPS will be conveyed to the 600 mm gravity sewer at the intersection of Prince Charles Street and Arthur Street by a 250 mm forcemain approximately 140 m long and a 200 mm forcemain 600 m. long. The SPS is equipped with a 175 kW standby diesel generator set. In 2006 pump hour readings for the period from 1998 to 2006 were analyzed to establish peak flows at the existing SPS. The current peak inflow is estimated at 32.1 L/s, which includes an anticipated peak flow of 12.1 L/s from the new Sports Complex. The new pumping station has been sized to accommodate pumps capable of discharging at an ultimate pump rate requirement of 97 L/s.

Durham Street SPS

The Durham Street Sewage Pumping Station drainage area is designated as SCA 4 and currently includes approximately 89.9 ha of residential, commercial core, and industrial lands. The SPS consists of two self-priming centrifugal sewage pumps in a dry pit/well arrangement. Each pump has a theoretical rated capacity of 20.1 L/s at 13.4 m. TDH. The SPS is currently operating at capacity and a new facility is expected to be complete in mid-2011. The new facility will also be a wet well/dry pit configuration, located at the northeast corner of Durham Street and Foster Street intersection. It is designed to handle an ultimate period peak flow rate of 251 L/s, and will be equipped with three pumps, each rated to handle a 20 year flow of 74 L/s at 13 m TDH. The facility will also be equipped with a 60 kW standby diesel generator set. Discharge from the SPS will be conveyed to the 600 mm gravity sewer at the intersection of Birmingham Street and Normanby Street by a 300 mm forcemain approximately 320 m long.

Gravity Sewage System

Most of the southern and eastern portion of the current built area of Mount Forest north of the river, designated as SCA 3, drains by gravity to the North Water Street Sewage Pumping Station (old sewage treatment plant). This drainage area includes approximately 195 ha of land, roughly 56% of the existing developed area, and is used for residential and core commercial purposes. Drainage of this area is provided by a series of trunk sewers running west along Birmingham Street and Wellington Street and then south along Arthur Street to North Water Street where it discharges to the North Water Street Sewage Pumping Station.

North Water Street Sewage Pumping Station

The North Water Street Sewage Pumping Station currently receives flow from all of the drainage areas. The facility is located on North Water Street east of Arthur Street. It is designed to handle an ultimate period peak flow rate of 173.6 L/s, and is equipped with 2 variable speed pumps, each rated to handle a flow of 173.6 L/s at 44.2 m TDH and 1 pump rated for 57.2 L/s at 17.7 m TDH. The maximum day flow to this location over the last 5 years has been 14,164 m^3, 167.4 L/s. and it is reported that the maximum discharge rate has been approximately 200 L/s. The designer has indicated that the increase of discharge capacity is currently limited by the forcemain size and treatment plant capacity. The facility is equipped with a 450 kW standby diesel generator set. There is approximately 1,288 m^3 of storage at the SPS which is used to store peak flows so that more uniform flows can be pumped to the new sewage treatment plant. Discharge from the SPS is to the new treatment plant through a 1,300 m long 300 mm forcemain and a 25 m long 250 mm forcemain.

In addition to sewage pumping and peak flow storage the former sewage treatment plant also contains 5 aerated tanks with a total capacity of 3,951 m^3 for the digestion and storage of sludge from the Mount Forest and Arthur Wastewater Treatment Plants. The sodium hypochlorite feed system, chlorine contact chamber and 11.5 m by 350 mm outfall pipe are also still available at this location for by-passing excess flows.

5.3.2 Sewage Treatment Plant

The new Mount Forest Sewage Treatment Plant is located on Martin Street west of Cork Street. It consists of an influent building complete with grit removal and handling - sized for a peak hydraulic flow of 15,000 m^3/d (177.3 L/s), septage receiving works, 2 – 1,730 m^3 three cell diffused air aeration tanks, two clarifier tanks, two single media effluent filters, ultra-violet disinfection works and an outfall sewer. The facility also includes inlet and outlet flow metering and an administration building complete with a 500 kW emergency diesel electric generator.

5.4 Future Sewage Collection Requirements

As with the water system an evaluation has been carried out based on current sewage flows and anticipated future design conditions. In the last Master Plan and recent design projects calculations were based on the MOE guidelines for the design of sanitary sewage works and sewage treatment plants. The primary basis for the hydraulic design of sanitary sewers, sewage pumping stations and sewage treatment facilities is the peak sewage flow.

Sewage flows have previously been based on average flows of 450 L/capita/d and 25 people per hectare plus 0.21 L/ha/s of infiltration with peak flow rates based on the Harmon peaking formula. Industrial flow rates were based on an average of 25 m^3/ha/d plus 0.21 L/ha/s of infiltration. Peak flows were calculated using a Harmon peaking factor based on equivalent populations of 56 people/ha for industrial lands and 40 people/ha for commercial and institutional areas.

5.4.1 Design Per Capita Sewage Flow

In order to predict future sewer system needs a review of the current average and peak sewage flows from residential and ICI customers was carried out. Limited data has been available from sewage pumping stations and historically growth related flows have been based on typical MOE design criteria. This combined with the high inflow and infiltration rates has resulted in a significant over estimation of sewage flows.

In order to improve on this the following assumptions were used to generate the per capita sewage flows and ICI equivalents.

(a) Water Use

All industrial, commercial and institutional (ICI) water use has been metered in Mount Forest since 2007. From Table 5.1 it can be seen that over the past three years, since metering of all ICI customers has been completed, ICI water consumption has accounted for approximately 42% of the total water supplied.

Table 5.1
Summary of Metered and Treated Water Volumes – 2007 to 2009

Year	ICI Water Use (m3/year)	Total Water Treated (m3/year)	ICI % of Total Water Treated
2007	259,065	606,542	43
2008	244,596	544,825	45
2009	183,685	496,915	37
Average	229,116	549,427	42

(b) Annual Average Sewage Flows

Sewage influent flows have been measured at the "old" Sewage Treatment Plant. For the purposes of estimating residential and ICI sewage flows we assume that sewage contributions from each of these use groups are proportional to water use (i.e. 42% ICI and 58% residential).

Table 5.2
Estimated Sewage Flows by Customer Type

Year	Total Sewage Flow (m^3/day)	ICI Average Flow (m^3/day)	Residential Avg. Flow (m^3/day)
2007	2,265	951	1,314
2008	2,635	1,107	1,528
2009	2,110	886	1,224
Average	2,336	981	1,355

Over the last three years of record the average residential sewage flow is assumed to be approximately 1,355 m^3/day. As identified in Appendix A the 2006 population in Mount Forest is approximately 4,750. Using a growth rate of 1.27% gives a 2010 population of 4,995. There are however approximately 163 people (65 households with 2.5 people per household) living on the south side of the river which are not currently served by communal sewers. Once this portion of the population is subtracted from the total population the average population sewage flow, not including non-residential water use, is approximately 280 L/cap./day. For future calculation purposes we propose 300 L/cap./day.

(c) Equivalent Population Flows

Currently, there are approximately 141.8 ha of developed residential land on the north side of the Saugeen River in Mount Forest. Development on the south side of the river is relatively new and spread out so for the purposes of this calculation it has been excluded. The average population density on the north side of the river is 34 people per ha. The average residential sewage flow per day is therefore 10.2 m^3/ha.

The equivalent populations for each type of ICI customer have been calculated by applying the percentage metered water use (as shown in Table 2.4 of Appendix B) to average ICI sewage flows. A summary is provided in Table 5.3.

Table 5.3
Equivalent Populations by Customer Class

Category	% of Total ICI Water Use	Estimated Sewage Flow (m^3/day)	Developed Land (ha)	Avg. Daily Sewage Flow (m^3/ha)	Equivalent Population (inc. 10% Factor of Safety)
Industrial	14	137	67.1	2.0	7
Commercial	48	471	31.8	14.8	54
Institutional	38	373	15.5	24.1	88

(d) Summary of Assumptions

1. Average daily per capita flow – 300 L/cap./day
2. Peak extraneous flow – 0.21 L/ha./s
3. Population density – residential 34 people/ha
    a. 88 people/ha institutional equivalent population;
    b. 54 people/ha commercial equivalent population;
    c. and 7 people/ha industrial equivalent population;
    d. Where mixed use, assumed commercial/institutional;
    e. Where areas contain both commercial and residential assumed, 50% of each.

The residential and industrial flows represent significantly low flows compared to the flows for these uses typically found in other locations and to the default design flows proposed by the MOE. While water works capacity design is typically largely controlled by fire protection requirements, sewage works are much more sensitive to actual municipal generation rates. Sewage system design is based on peak flow design including an allowance for inflow and infiltration (I/I). I/I has typically been a very significant issue in Mount Forest with unusually high peak flows being experienced in the older portions of town. While it is anticipated that some improvement has occurred as the result of remediation activities it is difficult to gauge the impact of this factor. Flows to be used for future design of specific sewage facilities should be evaluated carefully at the time of project implementation.

Appendix D contains summaries and calculations of:

- Current estimated peak flows to the Durham Street, Cork Street, and North Water Street Sewage Pumping Stations; along with
- The estimated future sewage flows from each of the Future Service Areas for the 20 year time frame; and
- The estimated peak sewage flows for the 50 year time frame.

5.5 Future Sewage Pumping Station Requirements and Upgrades

In order to meet the future needs of the municipality for sewage collection and treatment a number of sewage system extensions will be required which will require the construction of new sewage pumping stations and/or upgrading of existing stations. The following is a list of the basic sewage pumping facilities that will be required to meet the long term needs of the town.

1. *South Water Street* – There is approximately 186.5 ha of potential development land within the community of Mount Forest on the south side of the South Saugeen River. A 175 mm sewage forcemain and conduits for a power supply have been extended under the river. A sewage pumping station will be required on the south side of the river. A possible location is at the terminus of the forcemain.
2. *Coral-Lea Road* – Sewage collection for the lands north of Industrial Road, west of Hwy. #6, (FSA 2A & 3) and north of the former railroad east of Hwy. #6 (FSA 1B) will require construction of a new sewage pumping station in the vicinity of Coral-Lea Road and Nor-Park Drive in order to carry flows to the existing sewage collection system. Alternatively, the SPS could be located east of Hwy. 6 and north of Mount Forest Dr.

Replacement of both the Cork Street and Durham Street Sewage Pumping stations are underway. Table 5.3 shows the current and future capacity and predicted flows of these pumping stations. It can be seen that minor upgrades to enlarge the pumps will be required but the sewage pumping stations should have adequate capacity for 50 years of growth.

In the future it may be necessary to service lands adjacent to Hwy. 89 and west of Cork Street. Servicing this land would likely require the construction of a sewage pumping station due to the topography in this area. The necessary sewer main and SPS configuration will depend on how and when other areas of the Town are serviced, so at this time servicing this area has not been given thorough consideration. The location of the existing and proposed sewage pumping stations are shown in Figure 5.1.

Table 5.4
Sewage Pumping Station Capacity and Future Flows

SPS	Current Firm Capacity (L/s)	Max Expanded Capacity (L/s)	Peak Flow (L/s)	
			2030	2060
Durham St.	74 L/sec	251 L/sec	61.0	92.0
Cork St.	67 L/s	97.1 L/s	44.7	54.9
North Water St.	173.6 L/s	173.6 L/s[1]	213.3	288.1

Notes:
1. The maximum expanded potential capacity of the North Water St S P Stn is not available however it is noted that the station has pumped in excess of 200 L/s under high entry flow and storage conditions. Currently the size of the forcemain and the capacity of the treatment plant are identified by the designer as constraints on pumping station flow expansion.

As noted above the use of the updated sewage generation rates suggests that the Cork St. and Durham St. sewage pumping stations will have capacity beyond the 50 year design horizon.

The sewage treatment plant (STP) hydraulic capacity currently matches the pumping station capacity of 173 L/s. The peak flow to the STP is anticipated to exceed this capacity by 2030. Therefore both the main sewage pumping station and the sewage treatment plant would require expansion within the 20 year time frame based on projected growth.

5.6 Future Sewage Collection System Requirements

5.6.1 Upgrades of Existing Sewers

In the 2003 Master plan report a major requirement for future sanitary servicing was identified to be the determination of how to transmit sewage to the proposed new sewage treatment plant. Several alternatives were identified, and since the time of the report work has been completed that enables all future flows to be directed to the old sewage treatment plant (i.e. North Water Street SPS). It may be necessary to increase the size of sewers from Industrial Drive to the Durham Street SPS. All other trunk sewers servicing these pumping stations have capacity for 50 years of growth.

5.6.2 New Sewers

As development proceeds sewers will be required to convey flow to the proposed and existing sewage pumping stations. Sewers will be constructed to service the lands which will drain to the proposed South Water Street and Coral-Lea SPS's. Extensions of the existing gravity sewers, which drain to the Durham Street sewage pumping station, will also be required to service development of the London Road corridor. As development is not predicted to occur in the near term on Sligo Road two alternate servicing routes are proposed.

- *Alternate #1* – Extend services east on the unopened Birmingham Street to London Road and north on London Road from Wellington Street towards Birmingham Street. This will allow for the servicing of the property which fronts onto London Road between Durham Street and Wellington.

- *Alternative #2* – Extend the sewer east on Sligo Road to London Road and south on London Road. This will ultimately be required to service the property on the east side of London Road.

The locations of existing and proposed sewers are shown in Figure 5.1.

5.7 Assessment of Work Required

Since all work is anticipated to take place within previously disturbed areas on public lands there is expected to be minimal disruption of the Natural (soils, wildlife, water resources) and Cultural (heritage, archaeological) environments. However, a detailed assessment of these impacts would be carried out at the time of design of the projects and possible mitigating measures would be assessed at that time.

Appendix E contains an Opinion of Probable Costs for the works.

For estimating sewage pumping station costs the 50 year design flow requirements have been assumed as this will be the basis for structural construction. Normally pumps will be installed which are sized to serve for the first 10 to 20 years of station life. Forcemains are sized to provide the longest possible service while ensuring that maximum and minimum flow velocity requirements are met. An attempt has been made to include all costs and road remediation has included the full cost of road reconstruction including full width asphalt and curb and gutter where the municipality has indicated that this would be the level of remediation required.

Projects

- New SPS South Water Street with flow directed through existing forcemain to the old sewage pumping station (North Water St. SPS).
- New SPS on Coral-Lea with flow directed to the Industrial Dr. sewer which drain to the Durham St. SPS.
- Extending servicing to London Road corridor.

Summary of Costs

New South Water Street SPS and Forcemain	$ 937,000
New Bentley St Sewers	$ 662,000
New Bristol St Sewers	$ 639,000
New South Water Street Sewers	$ 400,000
New Coral-Lea SPS and Forcemain	$ 1,441,400
New Street (East of Hwy. #6) Sewers	$ 861,000
New Coral-Lea Drive Sewers	$ 800,000
Sub-total	$5,740,400
Alternative #1	
(Flow north on London Road and west on Birmingham Street)	
New London Rd. Sewers	
New Birmingham Sewers	$ 150,000
Sub-total	$ 390,000
	$ 540,000

Alternative #2		
(Flow north on London Road and west on Sligo)		
New London Rd. Sewers		
New Birmingham Sewers		$ 692,000
New Sligo Rd. Sewers		$ 375,000
	Sub-total	$ 467,000
		$ 1,534,000
Total (Alternative #1)		$ 6,280,400
Total (Alternative #2)		$ 7,274,400

N

MUNICIPALITY OF WEST GREY

MOUNT FOREST

CORAL - LEA SPS (OPTION A)

CORAL - LEA SPS (OPTION B)

PERTH ST. SPS

DURHAM ST. SPS

CORK ST. SPS

MAIN SPS

SOUTH WATER ST. SPS

SEWAGE TREATMENT PLANT

6

89

INDUSTRIAL

GREMON

CHURCH

LONDON

KING

CONNERY

OWEN

ARAILE

ALBERT

EGREMONT

FERGUS

ELGIN

WELLINGTON

NORMANBY

COLCLEUGH

DURHAM

PERTH

HENRY

PARKSIDE

YORK

JOHN

WATERLOO

PRINCESS

DUBLIN

CORK

MARTIN

MILL

BENTLEY

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

LEGEND

- Proposed SPS
- Existing SPS
- Existing Sewermain
- Future Sewermain
- Urban Center Boundary

BMROSS engineering better communities

TOWNSHIP OF WELLINGTON NORTH

SERVICING MASTER PLAN UPDATE

PROPOSED SANITARY INFRASTRUCTURE

DATE	PROJECT No.
JAN 14, 2011	08158
SCALE	FIGURE No.
As Shown	5.1

6.0 SUMMARY

6.1 General

This Master Plan Update for the Community of Mount Forest will allow the coordination of water and sanitary sewage works within existing and future servicing areas. The study area has unusual topographic features which particularly affect possible drainage patterns, sewage pumping requirements and the location of additional water storage. The Master Plan has been carried out in accordance with the MEA Class Environmental Assessment process for Master Plans so that projects arising from it will have completed Phases 1 & 2 of the Class Environmental Assessment.

6.2 Public Consultation

Public consultation represented an integral part of the Master Planning process. During this study, a consultation program was implemented to obtain input on key study issues from the general public, government review agencies, and key stakeholders. Information gathered through this process was incorporated into the analysis of future servicing needs and the evaluation of servicing alternatives. The following summarizes the general format of the consultation program.

a. General Public

Comments from local residents were solicited by way of a public notice and a public information meeting. The notice summarized the purpose and intent of the Master Plan Update study and requested comments from interested persons. The notice was issued in the November 10, 2010 and November 17, 2010 editions of the Mount Forest Confederate. The public open house was held on November 24, 2010 at the Mount Forest Sports Complex. Approximately 12 residents and stakeholders attended the information session. Copies of the newspaper notice are included in Appendix D of this report. A copy of the meeting minutes from the public open house, are also included in the appendix.

b. Review Agencies

Input into the study process was solicited from 13 review agencies or organizations by way of direct mail correspondence. Agencies that might have an interest in the project were sent a general project summary, which provided background information on the study, outlined the Master Planning process, and detailed future investigations. The information was circulated on November 4, 2010 and agencies were invited to attend the public open house or to submit written comments if they were unable to attend. A copy of the information bulletin and a list of agencies circulated project information are included in Appendix D.

A limited number of agencies provided comments for consideration. These comments are summarized in the following table and included in Appendix D.

Review Agency	Comments/Concerns	Action Taken
Saugeen Valley Conservation Authority (SVCA) November 23, 2010	- Portions of Mount Forest are subject to the SCVA's Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Regulation (Ontario Regulation 169/06). - Should any of the proposed works be subject to the regulation, a permit will be required. - Preliminary infrastructure plans associated with the Master Plan update should be circulated to the SVCA for review as soon as possible.	- Comments noted and filed.
County of Wellington Engineering Services November 17, 2010	- Planned on attending the public open house. - If unable to make it, the County wanted to stay on the circulation list for the project.	- Comments noted and filed.

c. Key Stakeholders

A number of local developers and builders were directly mailed a copy of the public open house notice in order to obtain their feedback on the Master Plan update. No comments were received as a result of this consultation.

6.3 Population Growth Analysis

Mount Forest currently contains 268 ha of existing and available infill development area with a 2011 population of 5,060 housed in 2,070 residential units. It contains a healthy industrial-commercial sector with good growth potential provided that adequate servicing is available. An additional 562 ha. of potential development area has been identified which will require servicing over the 50 year timeframe reviewed in conjunction with this study. The bulk of these lands are situated in the London Road area and south of the river on the former Murphy lands. Additional development and servicing lands exist in the north portion of Mount Forest within the Egremont annexation lands and potential annexation and servicing opportunities within West Grey Township.

Following the release of the Growth Plan for the Greater Golden Horseshoe (Growth Plan), a Population, Housing and Employment Forecast Update was prepared by C.N. Watson & Associates (2008) that was consistent with the policies and objectives of the Growth Plan. The County of Wellington prepared a Comprehensive Review of Residential and Employment Growth (2009) report for Wellington North which built upon the results of the C.N. Watson report to forecast residential and employment growth within the community to the year 2031.

The C.N. Watson forecast was subsequently adopted by the Municipality of Wellington North for planning purposes and led to the selection of a growth factor that is consistent with the Growth Plan for the period 2011 – 2031, then gradually declining for the latter half of the study period to rates more consistent with historic growth rates. This leads to expected increases in population of 51% over 20 years and 110% over 50 years, which are significantly higher than growth rates associated with the 2003 Master Plan document. Following discussions with municipal authorities and local developers, future growth and servicing requirements over the 20 and 50 year planning periods were allocated within the available lands for use in assessing future servicing needs.

An employment land needs forecast was developed for the Master Plan Update which built upon the job growth analysis completed for the Comprehensive Review. The projection methodology involved utilizing the industrial and highway commercial land requirements defined for the 2006-2031 planning period to extrapolate forecasts for the 2011-2031 and 2011-2061 planning periods.

The Comprehensive Review forecast methodology differs substantially from the non-residential growth projections developed in conjunction with the 2003 Master Plan. For the previous study, it was assumed that future non-residential land needs would be directly proportional to the amount of land required to meet residential growth. This approach assumed that the percentage of residential and non-residential land use defined for the base year (2001) would not change in the long-term. In comparison, the Comprehensive Review forecast links future employment land requirements to job growth projections rather than estimates of future residential development.

6.4 Water Supply, Storage and Distribution

Four wells and a water storage standpipe currently serve Mount Forest. Based on preliminary results of recent remediation work at Well #3 and reported capacities of the other three wells, the firm supply capacity of the well system (available supply with the largest well out of service) is estimated to be 62.4 L/s. The maximum day demand over the last three years of record is 40.2 L/s. which is approximately 30% less than at the time of the 2003 study. There is therefore currently an excess of supply over demand of about 55%. Following the installation of a booster pumping station after the last evaluation, the current volume of effective storage in the standpipe is 2,000 m^3. The calculated current storage requirement is 2,400 m^3 and the anticipated storage requirement to meet the 50 year service projection is 5,000 m^3.

A computer analysis of the Mount Forest water supply and distribution system shows that although upgrades to the water distribution system since the 2003 study have improved available fire flow to many locations in town, including the downtown commercial core, there are still a number of areas of the community which cannot be provided with the target flows to fight fires under specific demand conditions. Issues continue to be related to the lack of storage, presence of undersized distribution water mains and dead ends on the pipe system in some locations.

A number of possible solutions to the inadequate storage problem were evaluated and it was identified that additional elevated storage in the proposed new development lands at the north end of the community should be implemented in the near future and certainly as part of any extension of the water distribution system. This would also improve fire flow to several areas throughout the distribution system.

A number of upgrades to the water distribution system have been identified which should be carried out as soon as possible and as part of normal road and infrastructure remediation activities.

The estimated cost of these works is,

Proposed Water Main Upgrades and Extensions	$ 555,000
Trunk Water Main, Existing System to new Elevated Tank	$ 450,000
New Elevated Storage Tank - 3,000 m^3	$ 1,950,000
	$ 2,955,000

Additional trunk water main requirements to meet future land development needs, including an improved connection, from the 300 mm diameter watermain crossing of the South Saugeen River to the existing standpipe, have been identified. These additional works would be carried out as required to meet future demand and would typically be at the cost of the developer.

6.5 Sewage Collection

The Mount Forest sewage collection system historically received extremely high levels of inflow and infiltration which caused sewage backups into basements and by-passing of the sewage treatment plant (STP). A number of steps have been taken to overcome these problems including upgrading the Arthur St. sewer main, constructing a new STP and converting tankage at the former sewage treatment plant into equalization storage for excess flows. The former STP has been converted into a sewage pumping station with all flows to the new plant currently passing through it. Further work to reduce inflow and infiltration should continue however the problem has largely been alleviated.

Based on a detailed assessment of residential and non-residential water usage in Mount Forest per capita sewage flows were estimated. These flows are less than used previously for the purposes of estimating current and future peak flows to sewage pumping stations. This resulted in a reassessment of sewage system capacities and the affects of the projected growth. The most significant impact of these revised per capita sewage flow estimates has been to reduce the calculated peak sewage flows throughout the system.

The Cork St. sewage pumping station (SPS) was replaced with a new station and upgraded forcemain in 2010. Construction of a new station, to replace the Durham St. sewage pumping station, is anticipated to be complete mid-2011. Both of these stations have capacity to serve projected growth for more than the next 20 years and this capacity can be increased to serve the projected 50 year needs by replacing pumps. Based on projected sewage flows both the main

sewage pumping station and the sewage treatment plant will require expansion within the 20 year time frame. An assessment of current sewer capacity indicates that it may be necessary to increase the size of sewers from Industrial Drive to the Durham Street SPS in order to service lands in the northern part of the town. All other trunk sewers servicing these pumping stations have capacity for 50 years of growth.

A Class Environmental Assessment was completed for a new SPS on the south side of the South Saugeen River in 2009. This new SPS is to service lands in the southerly part of the town. As development occurs a sewage pumping station will also be required in the vicinity of Coral-Lea Dr. and Nor-Park Dr. to service development in the northern part of the town. Additionally, as development takes place trunk sewers will need to be extended to service currently un-serviced future development areas. Two alternative sewer main configurations have been considered for the servicing of land in the area of London road and Birmingham Street.

The estimated cost of these works is;

New South Water Street SPS and Forcemain	$ 937,000
New Bentley St Sewers	$ 662,000
New Bristol St Sewers	$ 639,000
New South Water Street Sewers	$ 400,000
New Coral-Lea SPS and Forcemain	$ 1,441,400
New Street (East of Hwy. #6) Sewers	$ 861,000
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Alternative #1	
(Flow north on London Road and west on Birmingham Street)	
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New Birmingham Sewers	$ 150,000
Sub-total	$ 390,000
	$ 540,000
Alternative #2	
(Flow north on London Road and west on Sligo)	
New London Rd. Sewers	
New Birmingham Sewers	$ 692,000
New Sligo Rd. Sewers	$ 375,000
Sub-total	$ 467,000
	$ 1,534,000
Total (Alternative #1)	$ 6,280,400
Total (Alternative #2)	$ 7,274,400

6.6 Recommendations

(a) General Recommendations

The following is recommended regarding use and implementation of this Master Plan Update for the Mount Forest Service Area.

1. This Master Plan should be referenced when considering all major development proposals, changes to principal planning documents, and upgrade or remediation of existing road, water or sewage infrastructure.

2. This Master Plan should be reviewed and updated, as necessary, at a minimum of five year intervals.

3. The Municipality should consider obtaining detailed topographic mapping for portions of the study area where mapping is currently unavailable. Existing mapping should be reviewed and updated as necessary.

4. The Master Plan Update has not addressed drainage issues. Consideration should be given to completing a Master Drainage Plan for Mount Forest. Remediation of storm drainage issues may help reduce inflow and infiltration within the sanitary sewer system.

5. Update Development Charges By-Law No. 52-08, as required, to include capital costs associated with infrastructure projects identified within the Master Plan Update.

6. The Municipality should consider adopting a policy of constructing all new watermains with a minimum diameter of 150 mm and upgrading existing watermains that are less than 150 mm in size. Where looping of watermains cannot occur, larger diameters than 150 mm should be considered.

(b) Recommendations for Service Area

The following recommendations pertain to specific projects within the Mount Forest Service Area.

1. Detailed planning should begin for the following watermain projects which will increase fire protection capability:
    a. Construction of additional elevated storage in the north end of the community, including connection to the existing watermain distribution network.
    b. Replacement of undersized watermains and completion of loops as opportunity permits, as identified within Section 4.8 of this report. For replacement of undersized watermain, priority should be given to watermain on Elgin and King Streets.

2. Detailed planning, design, and approvals are complete for watermain improvements, from the existing standpipe location to the intersection of North Water and James Streets, in order to provide improved water supply to the development lands in the south via the 300 mm diameter watermain crossing of the South Saugeen River. The Township should proceed with tendering and construction of this work as required to meet future demand requirements.

3. Detailed planning should continue for the construction of the South Water Street SPS, forcemain connection and trunk sanitary servicing connections along South Water Street.

4. Detailed planning should begin for the construction of sanitary sewers required to service the London Road development area.

5. Planning for watermain and sewer extensions required to service new development lands (West Grey/Murphy Lands) should begin as soon as all necessary planning approvals have been obtained.

All of the above is respectfully submitted.

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
P. E. Harrison, P. Eng.

Per _____
Kelly Vader, MCIP, RPP
Environmental Planner

:hv

References

E-mail Communication regarding current and future capacity of the Main SPS and the new WWTP, December 16, 2010, Triton Engineering.

Township of Wellington North, Class Environmental Assessment for Improvements to the Sanitary Sewage Collection System – Community of Mount Forest, January 28, 2009, B.M. Ross and Associates Limited.

"Design Guidelines for Drinking-Water Systems 2008", 2008, Ministry of the Environment.

"Design Guidelines for Sewage Works 2008", 2008, Ministry of the Environment.

The Township of Wellington North Comprehensive Review of Residential and Employment Growth, 2009, County of Wellington Planning and Development Department.

Growth Plan for the Greater Golden Horseshoe, 2006, Ministry of Public Infrastructure and Renewal.

Township of Wellington North, Class Environmental Assessment for a Water Supply and Sanitary Sewage Collection Master Plan, December 2003, B.M. Ross and Associates Limited.

County of Wellington Official Plan, 2000, County of Wellington Planning and Development Department.

Class Environmental Assessment, Environmental Study Report Addendum, Mount Forest Water Pollution Control Plant, August 2002, Triton Engineering Services Ltd.

Township of Wellington North, Groundwater Management and Protection Study, November 2001, Burnside Environmental.

Sanitary Sewer-Related Flooding Problems, Elgin and Arthur Streets in Mount Forest, Township of Wellington North, December 11, 2000, B.M. Ross and Associates Limited.

Mount Forest, Perth St. Industrial Park Sewage Pumping Station Design Brief, December 1998, B.M. Ross and Associates Limited.

Town of Mount Forest, Draft Report on the Inflow and Infiltration Flow Monitoring Study, August 1, 1995, Gore & Storrie Limited.

Town of Mount Forest, Report on Sanitary Sewer Servicing of Northeast Area, March 16 1993, B.M. Ross and Associates Limited.

The Physiography of Southern Ontario, Chapman & Putnam, 1984.

APPENDIX A
FUTURE LAND USE PROJECTIONS

APPENDIX A: FUTURE LAND USE PROJECTIONS

1.0 REVIEW OF DEVELOPMENT STATUS

1.1 General

This update of the 2003 Town of Mount Forest Water Supply and Sanitary Sewage Collection Master Plan (2003 Master Plan) has been initiated to set out a strategy to provide the community with adequate municipal water and sanitary sewage services for 20-year (2011-2031) and 50-year (2011-2061) planning periods.

The following information summarizes the nature of development and population growth in the Mount Forest area, with an emphasis on growth trends since completion of the 2003 Master Plan. The report also updates the land requirements needed to accommodate the projected growth in the community over the defined planning periods, based upon the current land use planning framework.

1.2 Development Trends

A. Information Sources

As with the 2003 Master Plan, a series of reports were reviewed to confirm general development trends in the study area. The following are among the key documents and reports examined during the update process:

- Statistics Canada Census of Population data from 1976 to 2006 for the former Town of Mount Forest (available at five-year intervals).

- The County of Wellington Official Plan (1999), which sets out long-term development objectives for the entire jurisdiction, as well as more defined land use strategies and growth management policies for specific planning areas (e.g. settlement areas, agricultural lands). The document includes population projections that are intended to provide a guideline for managing growth.

- The County of Grey Official Plan (2000). This document defines policies to guide the long-term development of lands bordering Mount Forest.

- The Population, Housing and Employment Forecast Update prepared by C.N. Watson & Associates (2008). This report provides a housing, population and employment forecast for Wellington North in accordance with the prescribed requirements of the Growth Plan for the Greater Golden Horseshoe (Growth Plan); a key initiative of the Places to Grow Act (2005).

  The Growth Plan was established to promote the efficient use of land and infrastructure as a means to curb urban sprawl, conserve resources and 'complete' communities. Municipalities incorporated into the Growth Plan are required to define land needs to accommodate growth projections until 2031. In this regard, the forecasts prepared in the C.N. Watson report have been incorporated into the County of Wellington Official Plan for growth management purposes.

- The Township of Wellington North Comprehensive Review of Residential and Employment Growth (2009) report prepared by the County of Wellington Planning and Development Department. The Comprehensive Review provides a detailed assessment of existing land use activities in the study area and a comprehensive analysis of future land requirements for residential, commercial and industrial activities. This analysis was specifically undertaken to review the development status of Mount Forest and to forecast residential and employment growth in the community to the year 2031. In this respect, the report builds upon the aforementioned C.N. Watson growth forecasts.

B. Existing Development Patterns

i. Overview

The community of Mount Forest can be characterized as a small urban centre which incorporates a strong industrial base, a higher-order commercial sector and a low density residential setting. The historic development of Mount Forest is attributed, in part, to its strategic location along the Owen Sound Road (Provincial Highway No. 6) at its intersection with Provincial Highway No. 89. As a result, the community has traditionally represented a prominent commercial and manufacturing node along the two transportation routes, as well as an important shipping point for agricultural and forestry products harvested in the area.

A considerable amount of highway commercial and light industrial development has been established along the Highway 6 corridor immediately northwest of Mount Forest, in the Municipality of West Grey. Portions of this development area were incorporated into the 2003 Master Plan for the purposes of long-term infrastructure planning. Accordingly a portion of these lands have also been included in the study area for the Master Plan update.

Figure A-1 and Table A-1 summarize the allocation of land use within Mount Forest and those West Grey lands incorporated into the study area. The land base values presented are derived from current zoning by-law information and are presented to provide a general conception of the existing development pattern within the community. The Built Boundary is also presented to illustrate the developed portion of the study area.

Table A-1
Existing Land Use Designations within the Stndy Area

Land Use	Land Base (% of Total)
Residential	213.7 ha (23.4%)
Mixed Use	12.0 ha (1.3%)
Commercial	10.5 ha (1.1%)
Highway Commercial	13.9 ha (1.5%)
Industrial	233.1 ha (25.5%)
Institutional	15.4 ha (1.7%)
Future Development	155.0 ha (16.9%)
Agricultural	126.5 ha (13.8%)
Open Space	18.5 ha (2.0%)
Natural Environment	116.4 ha (12.7%)
Total	915.0 ha (100%)

N

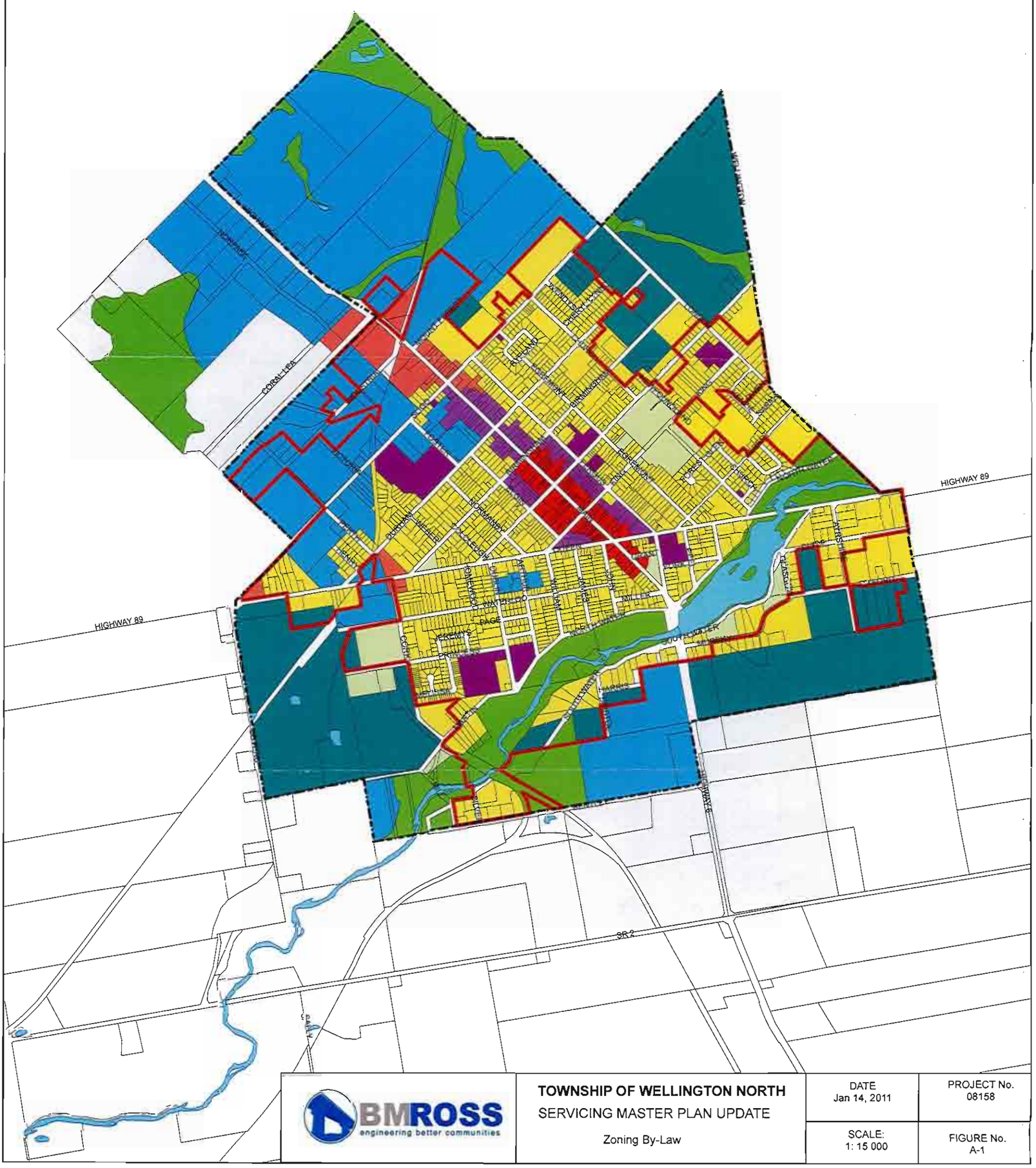
Legend

- Urban Centre Boundary
- Built Boundary

Zoning

- Agricultural
- Commercial
- Highway Commercial
- Industrial
- Institutional
- Mixed-Use
- Natural Environment
- Open Space
- Residential
- Future Development

Zoning	Area (ha)
Agricultural	126.5
Commercial	10.5
Future Development	155
Highway Commercial	13.9
Industrial	233.1
Institutional	15.4
Mixed-Use	12
Natural Environment	116.4
Open Space	18.5
Residential	213.7



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TOWNSHIP OF WELLINGTON NORTH

SERVICING MASTER PLAN UPDATE

Zoning By-Law

DATE	PROJECT No.
Jan 14, 2011	08158
SCALE: 1: 15 000	FIGURE No. A-1

ii. Residential Development Activities

As presented in Table A-1, approximately 23% of the land base within the study area is designated for residential activities. Table A-2 further illustrates that Mount Forest is predominately a low density residential community incorporating a high percentage of single detached dwellings. The table also demonstrates that, a significant proportion (30%) of local dwelling units are higher density units (i.e., apartments, row houses). In review, the distribution of dwelling types presented below closely reflects the 1996 Census data summarized in the 2003 Master Plan.

Table A-2
Residential Dwelling Types in Mount Forest (2006)

Dwelling Type	Units (% of Total)
Single Detached Units	1,135 (62.4%)
Semi-Detached Units	85 (4.8%)
Row Houses	70 (3.8%)
Duplexes	25 (1.4%)
Apartments	485 (26.6%)
Other	20 (1.1%)
Total	1,820 (100%)

* Source: Statistics Canada, 2006 Census (Mount Forest Dissemination Area)

Following an examination of recent housing market assessments and available construction data, it is apparent that the residential sector of Mount Forest is undergoing a period of gradual intensification. While single detached residential units remain the most prominent dwelling type being developed in the community, Table A-3 illustrates that a somewhat increasing number of moderate density units are being constructed locally. These units are generally being built in response to the preferences of younger working households and retirees. Market demand for these types of dwellings is also expected to remain strong in the long-term.

Table A-3
Residential Building Permits (2004-2010)*

Dwelling Type	Units (% of Total)
Single Detached	119 (55.6%)
Semi-Detached/ Duplex	9 (4.2%)
Row houses	60 (28.0%)
Apartments	26 (12.1%)
Total	214 (100%)

* Permit data for the period January 2004 to May 2010.

The following represent other recent developments in the residential sector that have relevance for infrastructure planning:

- Approximately 23.3 ha of industrial lands south of the South Saugeen River were recently re-designated to permit residential activities. These lands form the majority of the development area known locally as the Murphy property.

- Residential intensification represents a key objective of the Growth Plan. The County of Wellington has recently accepted a 20% intensification target for urban settlements as a measure to retain small town character and to revitalize downtown areas (i.e., 20% of new development will be situated within built-up areas). It is anticipated that this target will be achieved gradually over the planning period.

- The Comprehensive Review establishes a residential density of 16 units/ha for vacant designated areas in Wellington North which are not under planning review. For Mount Forest, 545 vacant potential dwelling units were identified within 'unplanned' residential areas as of January 2008. With the inclusion of the former Murphy property and several other large tracts of vacant residential land, it is estimated that there is a supply of almost 1600 vacant potential dwelling units within the study area.

iii. Commercial Development

Commercial development in Mount Forest is comprised of a traditional commercial core and a highway commercial district. Each area is briefly described below and generally identified in Figure A-1.

- The downtown core generally extends north along Main Street (Highway 6) from the intersection of Queen Street (Highway 89) to Sligo Road. The area consists of a diverse mixture of local retail and service shops, as well as small-scale commercial activities targeting the traveling public (e.g., gas stations, restaurants). The commercial core has benefited considerably from urban design initiatives which have enhanced the attractiveness of the streetscape and local storefronts.

- The highway commercial district exists primarily along Main Street and Highway 6 near the community's northern limit, and at the westerly end of Queen Street. This area is comprised of a number of large commercial activities that require large structures and a considerable amount of on-site parking (e.g. grocery stores, lumber yards).

In review, the structure and function of the two commercial districts has not changed in any substantive manner since completion of the Master Plan (2003). Approximately 2.8 ha of the Murphy property development area was recently re-designated to permit highway commercial development. It is anticipated that the redesignation of the Murphy property will ultimately facilitate the creation of a new highway commercial district along the route of Highway 6, south of the South Saugeen River.

The Comprehensive Review included an inventory of highway commercial land and a review of recent development uptake. It was noted that the study area incorporates an estimated 17.4 ha of developable, vacant highway commercial land. No vacant highway commercial land was absorbed through development between 2005 and 2008.

iv. Industrial Development

Mount Forest exhibits a relatively strong industrial sector comprised of numerous manufacturing and processing plants of varying sizes. The majority of these operations produce goods for the automotive, lumber, and furniture industries. Most local industries are situated in the northwest part of the community, along the Highway 6 and Sligo Road corridors. In the Comprehensive Review, the County of Wellington Planning and Development Department identified this area as having strategic importance as a centre for concentrated industrial development and new business growth.

The Comprehensive Review included an inventory of industrial land and a review of recent development uptake. It was noted that as of 2009 the study area incorporates an estimated 106 ha of developable, vacant industrial land (including lands in the northeast quadrant of the study area annexed from the former Township of Egremont). Approximately 2.3 ha of vacant industrial land were absorbed through development between 2005 and 2008. Given this level of land uptake, there appears to be a substantial land base available in the study area to accommodate future industrial land needs.

1.3 Review of Development Potential

A. Current Trends

A variety of information has been gathered to update the future development potential for residential, commercial, and industrial activities in Mount Forest. Among the key sources of reference surveyed for this project were long range planning documents and associated background reports, recent development proposals and building permit information, and discussions with municipal representatives.

In reviewing the information gathered from these sources, several key development trends were identified for the study area:

- The overall density of new residential development will gradually increase in accordance with the policy objectives of the Growth Plan. Intensification is expected to occur through the redevelopment of existing low density areas within the Built Boundary and through the increased construction of townhouse units and low-rise apartments. Residential growth is likely to be concentrated in development areas south of the South Saugeen River and in the community's east end near the London Road corridor.

- The downtown commercial area will continue to provide local retail and service activities. The highway commercial sector is anticipated to expand in response to both the overall increase in the local population and consumer demand for larger-scale retail facilities. Growth in the highway commercial sector could elevate the status of Mount Forest to a regional-scale commercial destination. In this regard, the Highway 6 corridor south of the South Saugeen River could ultimately develop into a significant highway commercial district.

- Industrial development is expected to occur gradually in the near-term, with new development being directed to the Mount Forest Industrial Park and serviced lands along the Highway 6 corridor. The industrial park may be expanded northwards if additional lands are needed to accommodate growth in this sector.

B. Growth Management Policies

The County of Wellington Official Plan (1999) and the County of Grey Official Plan (2000) set out the general development policies for lands within the study area. In each case, a growth strategy has been established which encourages and prioritizes development in designated urban areas. These areas possess the greatest range of infrastructure facilities and public services to accommodate future development. Both documents also prescribe that new development should be located in areas which have access to full municipal water and wastewater servicing.

In order to accommodate the projected levels of growth, the two Official Plans have designated lands which are suitable for urban development activities (refer to Figure A-2). Table A-4 summarizes the total land base in the study area allocated to specific Official Plan designations.

Table A-4
Designated Land Use Activities in the Study Area*

Land Use	Land Base (% of Total)*
Residential	273.1 ha (29.9%)
Residential Transition Area	18.1 ha (2.0%)
Central Business District	10.4 ha (1.1%)
Highway Commercial	61.9 ha (6.8%)
Industrial	162.4 ha (17.8%)
Policy Area	21.2 ha (2.3%)
Future Development	120.4 ha (13.2%)
Recreational	14.3 ha (1.6%)
Agriculture	127.0 ha (13.9%)
Core Greenland	105.9 ha (11.6%)
Total	914.7 ha (100%)

* Raw lands including unopened road allowances.

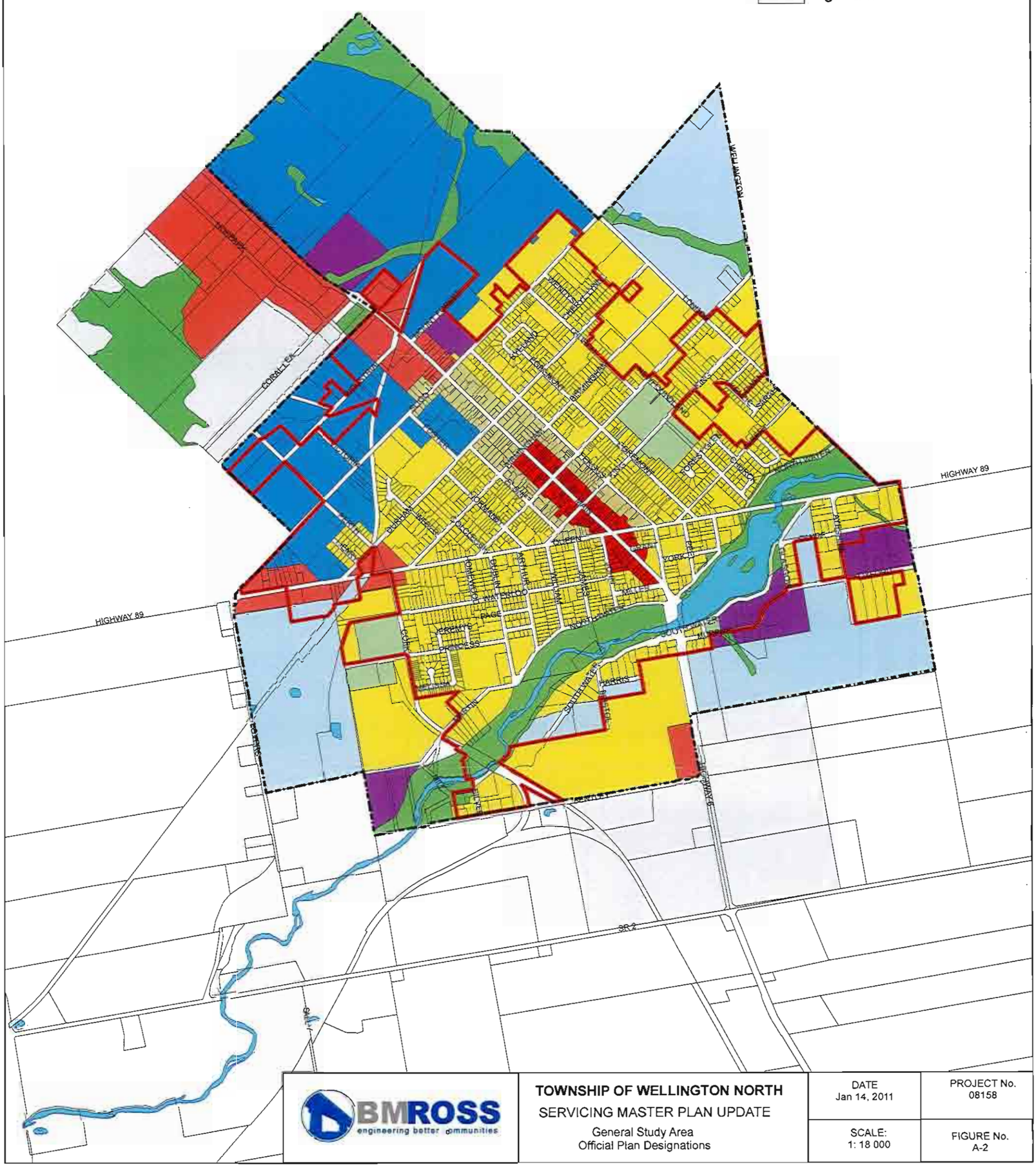
As discussed in the Master Plan (2003), lands designated Future Development are areas within the Mount Forest urban area where the Township has decided not to pre-designate for future intended uses. Development of these lands will only be considered when it is demonstrated, through a comprehensive study, that additional property is required to accommodate new land use activities.

N

OP Designation	Area (ha)
Agriculture	127
Central Business District	10.4
Core Greenland	105.9
Future Development	120.4
Highway Commercial	61.9
Industrial	162.4
Policy Area	21.2
Recreational	14.3
Residential	273.1
Residential Transition Area	18.1

Legend

- Urban Centre Boundary
- Built Boundary
- Core Greenlands
- Policy Area
- Industrial
- Highway Commercial
- Residential Transition Area
- Residential
- Recreational
- Regulatory Floodline
- Central Business District
- Future Development
- Agriculture



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TOWNSHIP OF WELLINGTON NORTH

SERVICING MASTER PLAN UPDATE

General Study Area
Official Plan Designations

DATE	PROJECT No.
Jan 14, 2011	08158
SCALE: 1: 18 000	FIGURE No. A-2

1.4 Growth and Development Projections

A. Background

i. Historic Growth Rates

Over the past 25 years, Mount Forest has experienced a relatively high rate of household growth and a relatively moderate level of population growth. Table A-5 illustrates that the number of households has increased by more than 580 over the previous 25-year reporting period. This equates to an annual household growth rate of 1.45%, which is considered high when compared to other small urban settlements in Midwestern Ontario. The local population has gradually increased from 3,376 persons in 1976 to 4,490 persons as of 2006. This equates to an average annual growth rate of 0.95%, which is comparable to growth levels experienced in other small urban settlements within the region.

Table A-5
Mount Forest Urban Area:
Historic Household and Population Growth (1976-2006)

Year	Households	Population	Interval Growth Rate*
1976	-	3,376	-
1981	1,341	3,474	+0.58%
1986	1,419	3,594	+0.68%
1991	1,749	4,266	+3.49%
1996	1,840	4,530	+1.21%
2001	1,885	4,584	+0.24%
2006	1,924	4,490	-0.41%
Growth	+ 583 (43.5%)	+1,114 (+33.0%)	-
Annual Average Growth Rate	+1.45%	+0.95%	-

* Average annual population growth by five-year interval periods.

ii. C.N. Watson Projection

C.N. Watson recently developed a 2006-31 population forecast for Mount Forest in accordance with the requirements of the Growth Plan. This projection has been subsequently adopted by the County of Wellington for land use planning purposes in Wellington North. This projection utilizes a housing market-based projection model and integrates growth forecasts defined by the Growth Plan. The forecast also includes an undercount component within the population forecast, to allow for transitory populations. The undercount does not affect household forecasts. Table A-6 summarizes the results of the C.N. Watson projection.

Table A-6
Mount Forest Urban Area:
Household and Population Growth Projections (2006-2031)

Year	Households	Population*	Interval Growth Rate
2006	1,920	4,750	-
2011	2,070	5,060	+1.27%
2016	2,290	5,610	+2.08%
2021	2,540	6,280	+2.28%
2026	2,800	6,950	+2.05%
2031	3,050	7,620	+1.86%
Growth	1,130 (58.9%)	+2,870 (+60.4%)	-
Annual Average Growth Rate	+1.87%	+1.91%	-

* Forecast incorporates an undercount adjustment (4.75%).

The rates of population and household growth presented in Table A-6 are substantially higher than those developed previously for the 2003 Master Plan forecast. In this regard, the 2003 Master Plan estimated household and population and growth rates of 1.20% and 1.15%, respectively. Over a 25-year period, the 2003 Master Plan anticipated approximately 700 additional households and a population increase of approximately 1,600 persons. It was also anticipated that the household density would gradually decline from 2.44 persons per household (pph) to 2.40 pph. The C.N. Watson projection, in contrast, predicts that household densities will increase marginally from 2.36 pph to 2.38 pph during this time frame (the undercount adjustment was excluded from the household density calculation).

Given the variance between the 2003 Master Plan forecast and the C.N. Watson projection, it is apparent that applying the forecasts set out in the Growth Plan greatly accelerates the rates of population and household growth for Mount Forest. It is also assumed that under the C.N. Watson projection, a substantial portion of new households in the community will be younger families. This would account for the predicted increase in household density over the forecasting period.

B. Projected Residential Growth

For the purposes of this assessment, household and population forecasts were developed for the 2011-2031 and 2011-2061 planning periods using the C.N. Watson projection as a framework. Several alternative growth scenarios were evaluated for this assessment, each building upon the 2011-2031 projection approved by the County of Wellington for planning purposes. A forecast was ultimately selected which utilizes the interval growth rates of the C.N. Watson projection to extrapolate growth levels between 2031 and 2061.

The principal elements of the projection methodology are as follows:

- Household and population forecasts developed by C.N. Watson for the Mount Forest urban area are adopted as the 20-year growth projection for this study.

- Population growth rates for the period 2031-2061 will gradually decline from the peak growth period of 2016-2021 to levels more consistent with historic growth. Specifically, it is assumed that population growth will decline from the 2031 growth rate (1.86%) at a rate of 0.042% per year (0.21% per five-year interval). This rate of decline equates to the average annual change in the interval growth rate for the years 2021 (2.28%) and 2031, as presented in Table A-7.
- Household density is assumed to remain constant at 2.38 pph for the period 2031-2061. The calculation of total households did not incorporate the population undercount adjustment.
- No adjustment was made to account for existing households within those West Grey lands included in the study area. These lands, which are primarily used for commercial and farming activities, do not contain an appreciable number of residential units.

Table A-7 presents the projected household and population forecast for the study area for the period 2011-2061. Given the historical information identified in Table A-5, the findings of recent demographic analyses, and the growth rates prescribed by the Growth Plan, it would appear that the 50-year forecast is a reasonable expectation of long-term growth for the defined study area.

Table A-7
Population and Household Forecast for the Study Area (2011-2061)

Year	Households	Population*	Interval Population Growth Rate**
2006	1,920	4,750	-
2011	2,070	5,060	+1.27%
2016	2,290	5,610	+2.08%
2021	2,540	6,280	+2.28%
2026	2,800	6,950	+2.05%
2031	**3,050**	**7,620**	**+1.86%**
2036	3,320	8,270	+1.65%
2041	3,560	8,880	+1.44%
2046	3,790	9,440	+1.23%
2051	3,980	9,930	+1.02%
2056	4,150	10,340	+0.81%
2061	**4,270**	**10,650**	**+0.60%**
Growth (2011-2061)	2,200 (+106.2%)	+5,590 (+110.5%)	-
Annual Average Growth Rate***	+1.46%	+1.50%	-

* Forecast incorporates an undercount adjustment (4.75%).
** Average annual population growth by five-year interval periods.
*** Rate calculated for the period 2011-61.

As presented, an estimated 2,200 additional households would be established in the community during the 50-year planning period. This represents a 1.46% annual average household growth rate, which is consistent with historic household growth levels but is considerably higher than the household growth rate for the period 1991-2006 (0.65%). The population of the community is expected to increase from 4,750 to 10,650 persons over this time frame. This equates to a 1.50%

annual average population growth rate, which is substantially higher than the historic growth rate (0.95%) and significantly higher than the annual growth rate experienced over the period 1991-2006 (0.34%).

The 2003 Master Plan projection anticipated 543 and 1,448 new households over the 20-year and 50-year planning periods, respectively. These estimates are substantially lower than the household growth forecasts presented in Table A-7. Similarly, the previous plan's population growth estimates are considerably lower than the forecasts prepared for this update and discussed above. Over the 20-year and 50-year planning periods, the 2003 Master Plan projection anticipated an increase of 1,235 persons and 3,739 persons, respectively. In review, the variance between the previous forecast and the values presented in Table A-7 reflects the influence of the Growth Plan projection methodology (i.e. elevated population estimates, increased household density).

C. Future Residential Land Needs

A residential land needs forecast was developed for this study which built upon the analysis carried out for the Comprehensive Review. The projection methodology involved extrapolating land requirements from the household growth forecast presented in Table A-7, with consideration for the existing vacant land supply, anticipated residential densities and intensification targets.

The following represent the key assumptions of this forecast methodology:

1. There will be no substantive change in the characteristics of the Mount Forest housing market over the course of the 50-year planning period. In this respect, the residential development patterns and consumer preferences anticipated for Wellington North in the Comprehensive Review will remain applicable in the long-term.

2. The rate of residential intensification in built-up areas will increase from 10% during the period 2011-16 to 15% between 2016 and 2021. The 20% intensification target set out by the County of Wellington will be achieved as of 2021 and will remain constant throughout the balance of the projection.

3. The inventory of vacant residential dwelling units within the Built Boundary and the Urban Boundary is based on the survey work carried out for the Comprehensive Review. A total of 30 dwelling units will be built between July 2009 and December 2010. These units will be constructed on existing lots of record within the Built Boundary.

4. A residential density of 16 units/ha will be applied to residential lands which to date, have not been subject to the planning process (i.e., unplanned residential lands).

5. In the near-term, residential development will occur primarily on infilling parcels within the Built Boundary and vacant lots within planned developments in the Urban Boundary. As the stock of lots of record declines due to uptake, vacant designated areas within the Urban Boundary and the Future Development Area will be made available for new development. For the purposes of this assessment, the Urban Boundary area represents all lands designated Residential within the Mount Forest urban area which are (1) situated outside of the Built

Boundary and (2) not designated Future Development. The Future Development Area is comprised of lands within the Urban Boundary designated for future development.

6. The specific rates of residential unit uptake, excluding intensification units, employed for this assessment are as follows:

   - 60% of new development will occur within the Built Boundary until build-out;
   - 40% of new development will occur within the Urban Boundary until build-out of the Built Boundary. At that time, 80% of new development will occur within the Urban Boundary;
   - 20% of new development will occur within the Future Development Area following build-out of the Built Boundary. 30% of new development will occur within this area following 2041.

Table A-8 presents the results of the residential development forecast for the study area. Figure A-3 illustrates the conceptual distribution of residential land uptake for the 20-year and 50-year planning periods.

Table A-8
Residential Uptake Forecast for the Study Area (2011–2061)

Forecast Interval	New Units	Intensification Uptake	Built Boundary Uptake	Urban Boundary Uptake	Future Development Area Uptake
2011-2015	220	22	102	96	0
2016-2020	250	38	94	118	0
2021-2025	260	52	0	208	0
2026-2030	250	50	0	200	0
2031-2035	270	53	0	173	44
2031-2040	240	49	0	133	58
2041-2045	230	45	0	112	73
2046-2050	190	39	0	84	67
2051-2055	170	33	0	78	59
2056-2060	120	24	0	45	51
Total	**2,220**	**405**	**196**	**1247**	**352**

Given a development density of 16 units/ha for raw lands, it is anticipated that approximately 29 ha of land outside of the Built Boundary would be required to accommodate residential growth projections for the 20-year planning period. At the conclusion of the 50-year planning period, approximately 103 ha of land outside of the Built Boundary would be required for residential purposes. It is also estimated that approximately 32 ha of Future Development lands may potentially need to be re-designated to meet the residential land needs during the latter half of the 50 year planning period.

The land requirements noted above differ appreciably from the residential land requirement projections prepared for the 2003 Master Plan. Based upon the 2003 Master Plan forecasts, a total of 25.5 ha and 87.9 ha of additional land was required to accommodate residential growth

projections for the 20-year and 50-year forecasts, respectively. These values are moderately less than the land needs required to accommodate the updated residential forecast. However, as discussed previously, the total number of new household units proposed in the 2003 Master Plan over the 50-year planning period (1,448) was substantially lower than the household additions established for the updated forecast (2,200). This apparent inconsistency is attributed to the application of intensification targets in the updated forecast, as prescribed by the Comprehensive Review document.

D. Employment Growth Projections

i. Analysis of Employment Trends

The Comprehensive Review incorporated an analysis of employment trends and growth projections in Wellington North. This analysis was conducted to forecast the long-term land requirements to accommodate future employment opportunities and job growth. The assessment took into consideration several relevant factors, including servicing requirements and availability, parcel sizes, ownership patterns and site locations. It was also assumed that to facilitate job growth, additional employment lands would be specifically required in those areas designated for industrial and highway commercial activities.

The following highlights were noted from the employment growth assessment:

- A total of 1,890 new jobs are forecasted for Wellington North over the planning period 2006-2031. Approximately 35.6% (673) of these positions would be created in the industrial sector; approximately 22.4% (423) jobs would be related to commercial activities. The remainder of the job growth would be created in fields which would not require additional employment lands (e.g., home-based businesses, primary industries, building contractors).

- The forecasted job growth in the industrial and commercial sectors equates to a total future land requirement of 28.6 ha and 12.7 ha, respectively. These land needs projections were predicated upon assumed employment densities of 23.5 jobs/ha for industrial activities and 33.4 jobs/ha for commercial activities.

Following an assessment of parcel sizes and site locations in Mount Forest, it was concluded that there is a broad range of serviced industrial parcels in the north end of the community to accommodate future development activities. However, it was noted that approximately half of the supply of vacant employment land (industrial and highway commercial) is constrained by lack of servicing.

N

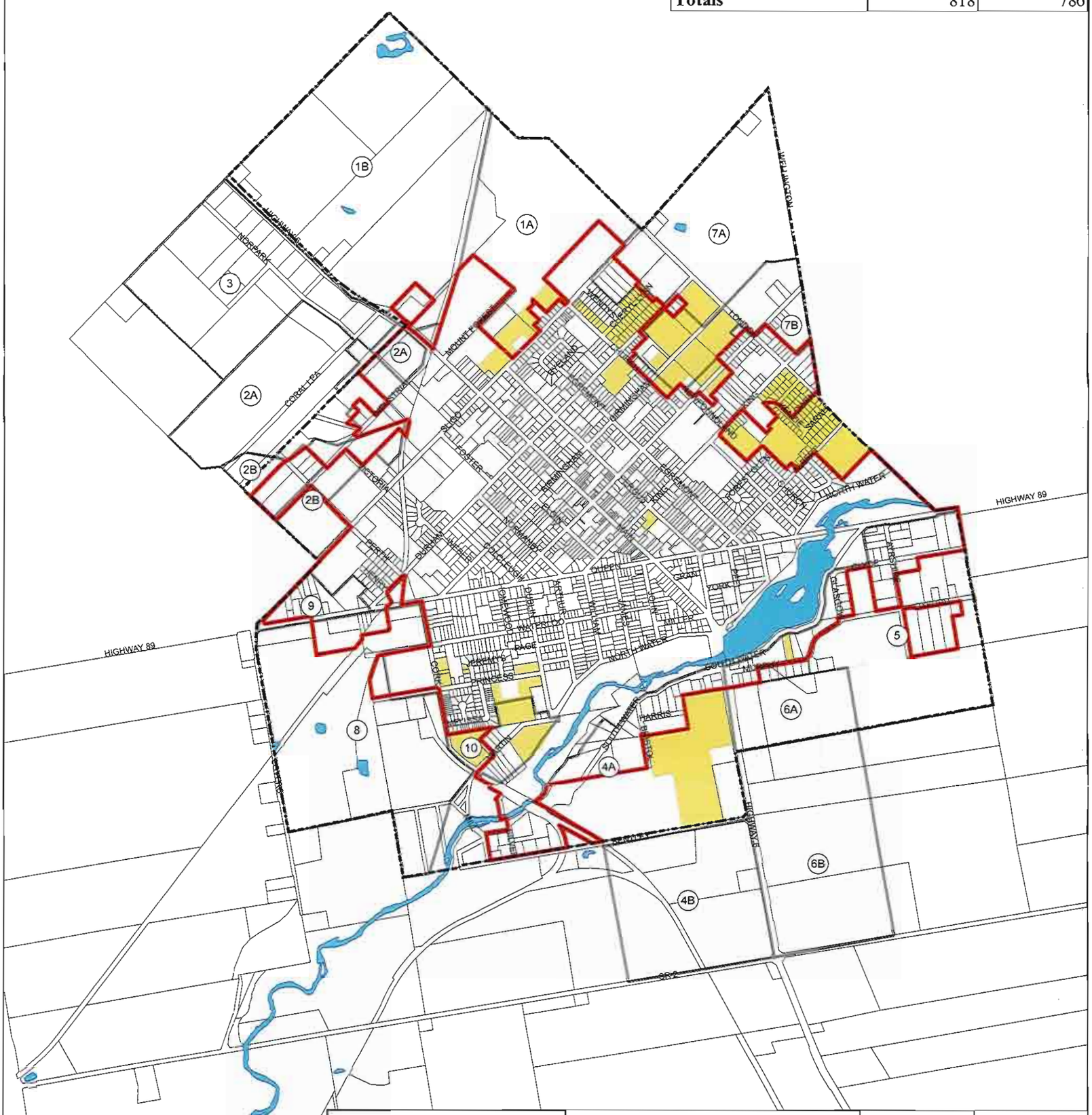
Legend

- Urban Centre Boundary
- Built Boundary
- Future Service Areas

Growth Needs

- 2031, Residential
- 2061, Residential

Estimated # of Units		
	2011-2031	
Future Service Area	**Units**	**Units**
1A	85	0
1B	0	0
2A	0	0
2B	0	0
3	0	0
4A	254	128
4B	0	0
5	2	148
6A	0	125
6B	0	0
7A	39	127
7B	128	91
8	0	167
9	0	0
10	46	0
In Built Boundary	264	0
Totals	818	786



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TOWNSHIP OF WELLINGTON NORTH

SERVICING MASTER PLAN UPDATE

Residential Land Needs (Conceptual)

DATE	PROJECT No.
Jan 14, 2011	08158
SCALE: 1: 18 000	FIGURE No. A-3

ii. Future Land Needs

An employment land needs forecast was developed for this study which built upon the job growth analysis completed for the Comprehensive Review. The projection methodology involved utilizing the industrial and highway commercial land requirements defined for the 2006-2031 planning period to extrapolate forecasts for the 2011-2031 and 2011-2061 planning periods.

The Comprehensive Review forecast methodology differs substantially from the non-residential growth projections developed in conjunction with the 2003 Master Plan. For the previous study, it was assumed that future non-residential land needs would be directly proportional to the amount of land required to meet residential growth. This approach assumed that the percentage of residential and non-residential land use defined for the base year (2001) would not change in the long-term. In comparison, the Comprehensive Review forecast links future employment land requirements to job growth projections rather than estimates of future residential development. Taking this into account, an employment-based methodology is considered to be a more reasonable and accurate method for estimating long-term non-residential land needs.

The following represent the key assumptions of the employment land forecast developed for this update:

1. There will be no substantive change in the local economy or employment base in Mount Forest over the 2011-2061 planning period. In this respect, the rate of job growth and distribution of employment anticipated for Wellington North in the Comprehensive Review will be consistent over the 50-year planning period. Accordingly, additional employment lands will only be required for industrial and highway commercial activities. It is therefore assumed that growth in other non-residential sectors, such as institutional activities, (1) will be minor in nature and (2) will be either accommodated within the Built Boundary or absorbed into the highway commercial and industrial land needs projections.
2. The employment densities presented for industrial and highway commercial activities in the Comprehensive Review will remain consistent over the 2011-2061 planning period.
3. The employment growth anticipated for Wellington North will be distributed between three development areas as set out in the Comprehensive Review; Mount Forest, the community of Arthur, and the rural area. For the purposes of this assessment, it is anticipated that the study area will be apportioned 70% of future industrial development and 65% of future commercial growth. The proportion of employment growth applied to the Mount Forest development area is considered conservative in nature.

Table A-9 presents the results of the employment lands forecast for the study area.

Table A-9
Employment Land Needs Forecast for the Study Area (2011 – 2061)

Forecast Interval	Industrial Sector		Commercial Sector		Total Employment	
	Jobs	Land (ha)	Jobs	Land (ha)	Jobs	Land (ha)
2011-2015	94	4.0	55	1.7	149	5.7
2016-2020	94	4.0	55	1.6	149	5.6
2021-2025	95	4.0	55	1.6	150	5.6
2026-2030	**94**	**4.0**	**55**	**1.7**	**149**	**5.7**
2031-2035	94	4.1	55	1.6	149	5.7
2031-2040	94	4.0	55	1.7	149	5.7
2041-2045	94	4.0	55	1.6	149	5.6
2046-2050	95	4.0	55	1.7	150	5.7
2051-2055	94	4.0	55	1.6	149	5.6
2056-2061	**94**	**4.0**	**55**	**1.7**	**149**	**5.7**
Total	**942**	**40.1**	**550**	**16.5**	**1492**	**56.6**

iii. Employment Lands Uptake

In the near-term, industrial and highway commercial development will occur partially on infilling parcels within the Built Boundary and partially on vacant lots within the Urban Boundary which have access to municipal servicing. As the stock of vacant, serviced employment lands within the Built Boundary and Urban Boundary decline due to uptake, unserviced, designated lands within the Urban Boundary will be utilized for new development. Ultimately, it is anticipated that vacant lands within the Future Development Area (Hwy. 6 south) will be made available to accommodate highway commercial activities.

The specific rates of employment lands uptake utilized for this assessment are as follows:

- For commercial activities, all new development will occur within the Built Boundary until build-out. Following build-out, all long-term growth will occur within the Urban Boundary with the exception of one development site located within the Future Development Area (as illustrated in Figure A-4).
- For industrial activities, 30% of new development will occur within the Built Boundary until build-out with the balance of growth occurring within the Urban Boundary. Following build-out of the Built Boundary area, all new development will occur within the Urban Boundary area.

Tables A-10 and A-11 present the results of the commercial and industrial development forecasts for the study area, respectively. Figure A-4 illustrates the conceptual distribution of employment land uptake for the 20-year and 50-year planning periods.

N

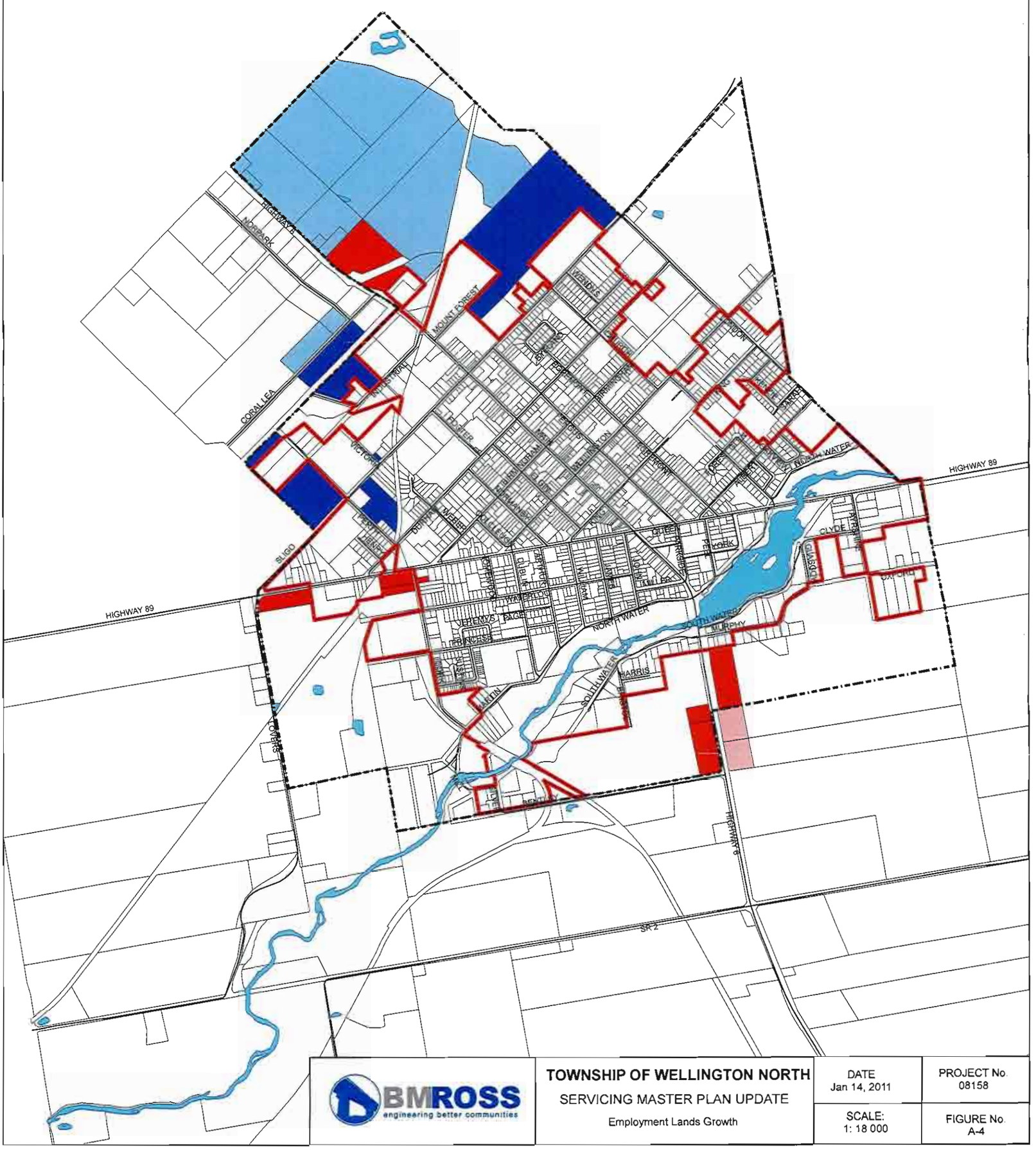
Legend

- Urban Centre Boundary
- Built Boundary

Growth Needs

- 2031, Commercial
- 2061, Commercial
- 2031, Industrial
- 2061, Industrial

Estimated # of Jobs				
	2011-31		2031-61	
Future Service Area	Commercial	Industrial	Commercial	Industrial
1A	0	505	0	144
1B	143	0	0	1660
2A	0	145	0	76
2B	0	144	0	0
3	0	0	0	0
4A	120	0	0	0
4B	0	0	0	0
5	0	0	0	0
6A	106	0	120	0
6B	0	0	0	0
7A	0	0	0	0
7B	0	0	0	0
8	110	0	0	0
9	0	0	0	0
10	0	0	0	0
In Built Boundary	5	61	0	0
Totals	484	855	120	1880



BMROSS engineering better communities	**TOWNSHIP OF WELLINGTON NORTH** SERVICING MASTER PLAN UPDATE Employment Lands Growth	DATE Jan 14, 2011	PROJECT No. 08158
		SCALE: 1: 18 000	FIGURE No. A-4

Table A-10
Summary of Commercial Land Requirements for the Study Area*

Development Area	2011-2031		2031-2061		2011-2061	
	Jobs	Land	Jobs	Land	Jobs	Land
Built Boundary	3	.1 ha	0	0 ha	3	0.1 ha
Urban Boundary	217	6.5 ha	265	7.9 ha	482	14.4 ha
Future Development	220	0 ha	65	2.0 ha	65	2.0 ha
Total	220	6.6 ha	330	9.9 ha	550	16.5 ha

* Lands required outside of the Built Boundary.

Table A-11
Summary of Industrial Land Requirements for the Study Area*

Development Area	2011-2031		2031-2061		2011-2061	
	Jobs	Land	Jobs	Land	Jobs	Land
Built Boundary	72	3.1 ha	0	0 ha	72	3.1 ha
Urban Boundary	305	13.0 ha	565	24 ha	870	37.0 ha
Total	377	16.1 ha	565	24 ha	942	40.1 ha

* Lands required outside of the Built Boundary.

As presented, a considerable amount of non-residential development is projected for lands outside of the Built Boundary. It is also anticipated that the existing stock of serviced commercial and industrial lands will be exhausted prior to the conclusion of the 20-year planning period. Service extensions will therefore be required in order to accommodate growth during the period 2031-2061.

The results of the employment lands forecast differ considerably from the non-residential development forecasts prepared for the 2003 Master Plan. The key differences between the two projections are as follows:

- For commercial development, the 2003 Master Plan forecast anticipated 3.1 ha and 8.3 ha of additional land needs over the 20- and 50-year planning periods, respectively. This represents approximately 50% of the land base anticipated by the employment lands forecast. In review, the 2003 Master Plan forecast may have underestimated long-term growth in this sector due to the relatively limited amount of land designated highway commercial relative to the residential land base. Long-term growth in the residential sector therefore did not generate a substantial increase in the future land requirements for highway commercial activities.

- For industrial development, the 2003 Master Plan forecast estimated 25.0 ha and 87.9 ha of additional lands over the 20- and 50-year planning periods, respectively. These values are significantly higher than the employment lands forecast, which is attributed to the relatively large industrial land base existing in Mount Forest. Accordingly, long-term growth in the residential sector generated substantial land needs in the industrial sector.

- The 2003 Master Plan anticipated growth in the institutional sector. As noted, it is assumed in the employment lands forecast that the land needs of new institutional uses (e.g., churches) would be limited and would be absorbed either within the Built Boundary or as part of the employment lands projections.

Given these considerations, it is assumed the forecasts presented in Tables A-10 and A-11 provide more accurate assessments of employment land needs than those developed previously for the 2003 Master Plan.

E. Summary of Additional Land Requirements

Upon review of the growth forecasts presented in this section of the report, a substantial land base outside of the Built Boundary will be required to accommodate the projected levels of population and household growth in Mount Forest. Table A-12 summarizes the estimates of future land requirements for residential, industrial and commercial activities at the conclusion of the 20-year and 50-year planning periods.

Table A-12
Summary of Additional Land Requirements for the Study Area*

Land Use	2031	2061
Residential	29 ha	74 ha
Industrial	16.1 ha	24 ha
Commercial	6.6 ha	9.9 ha
Total	51.7 ha	107.9 ha

* Lands required outside of the existing service area.

Existing Service Areas and Populations

Existing development in the Mount Forest service area can be subdivided into four specific areas. The areas, which were developed for the Master Plan (2003), are based on the Sanitary Drainage Catchment Areas developed for the three existing sewage pumping stations and one area that currently drains to the existing Sewage Treatment Plant by gravity. Figure A-5 identifies each catchment area and associated sewage pumping station.

The following summarizes the general characteristics of each catchment area, as well as the anticipated long-term land uses for these areas. Details regarding the approximate size of catchment areas and components of these areas have been updated from the Master Plan (2003) with more accurate property information

Sanitary Catchment Area 1

Sanitary Catchment Area 1 (SCA 1) is situated near the western limit of Mount Forest, north of Industrial Drive and west of Victoria Street. This 6.5 ha area is predominately planned for industrial development and is serviced by the Perth Street Pumping Station. The area incorporates a limited amount of light industrial development fronting Perth Street.

Sanitary Catchment Area 2

Sanitary Catchment Area 2 (SCA 2) is situated along the western limit of Mount Forest, generally south of Industrial Drive and west of Dublin/ Colcleugh/ Weber / Normanby Streets. SCA 2 has a land base of 134.5 ha which is composed of residential, industrial, highway commercial and

recreational components. The majority of the area is used for low- and moderate-density residential activities. The Cork Street Pumping Station services lands within this defined area.

In total, the Official Plan anticipates that 46.3 ha of property in SCA 2 will be used for residential purposes (being lands situated south of Queen Street and east of Cork Street). Light industrial activity is also present north of Queen Street. Approximately 27.5 ha of land is designated for such activity. A relatively small portion of the land fronting Queen Street (3.2 ha) is planned for highway commercial activity. The community's new arena complex is also situated within this catchment area.

Sanitary Catchment Area 3

Sanitary Catchment Area 3 (SCA 3) generally extends east to west from Dublin Street to London Road and north to south from Durham Street to the South Saugeen River. This 159.5 ha area is mainly composed of residential, downtown commercial and public uses. As with SCA 2, the majority of land in this area is used for low- and moderate-density residential activities. Sanitary sewage drains from these lands by gravity to the former Mount Forest Sewage Treatment Plant which was converted to a sewage pumping station following construction of the new sewage treatment facility.

The Official Plan anticipates that 123.3 ha of land in SCA 3 will be used for residential purposes. The residential district generally extends east and west from the downtown commercial core. With respect to commercial activities, SCA 3 includes all lands within the central business district which are south of Birmingham Street and adjacent to Main Street, as well as lands immediately adjacent to the downtown core which are designated for residential uses and commercial uses considered to be compatible with residential activities (e.g., professional offices, studios, nursing homes). In total, 10.4 ha of land is designated for downtown commercial activities and 10.1 ha of property is designated as Residential Transition. A further 6.0 ha of land along the London Road corridor is designated for future development.

Sanitary Catchment Area 4

Sanitary Catchment Area 4 (SCA 4) represents the largest sanitary drainage area in Mount Forest. This area is situated in the north end of the community and generally extends west to east, from Weber Street to London Road, and south to north, from Wellington Street to the old Town limits. The Durham Street Sewage Pumping Station, which is currently being reconstructed, services lands in this defined area.

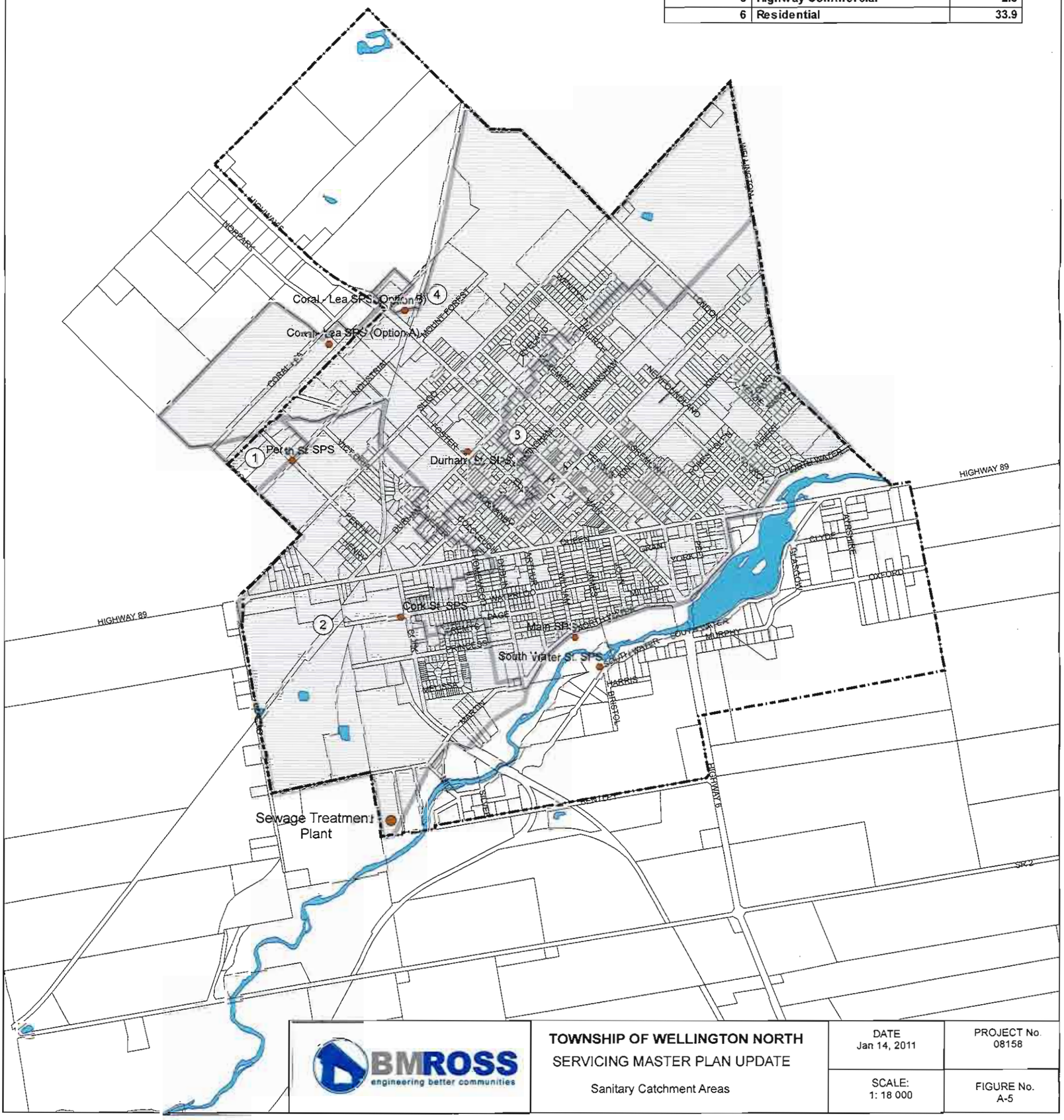
SCA 4 has a land base of 185.8 ha and is comprised of residential, highway commercial and industrial activities. The residential district (35.3 ha) generally extends east and west from the downtown commercial core. The highway commercial component is situated along Main Street, north of Sligo Road. A total of 10.1 ha of land are set aside for car-oriented commercial activities. Industrial lands, which front Industrial Drive and Mount Forest Drive, comprise 53.9 ha of the land base. A small portion of SCA 4 (8.0 ha) adjacent to Main Street and Sligo Road is designated as Residential Transition. This area currently contains a mixture of commercial and low density residential uses. Future development lands (28.7 ha) are also situated in this catchment area, south of Sligo Road in the community's east end.

N

Legend

- Sewage Pumping Stations
- Urban Centre Boundary
- Sanitary Catchment

Identifier	OP Designation	Area (ha)
1	Agriculture	1
1	Industrial	5.5
2	Core Greenland	0.4
2	Future Development	40.2
2	Highway Commercial	9.7
2	Industrial	27.5
2	Policy Area	4.2
2	Recreational	6.2
2	Residential	46.3
3	Central Business District	10.4
3	Core Greenland	2
3	Future Development	6
3	Recreational	7.7
3	Residential	123.3
3	Residential Transition Area	10.1
4	Agriculture	24.8
4	Core Greenland	12.2
4	Future Development	28.7
4	Highway Commercial	10.1
4	Industrial	53.9
4	Policy Area	2.7
4	Residential	45.4
4	Residential Transition Area	8
5	Agriculture	1.3
5	Core Greenland	15.5
5	Highway Commercial	30.8
5	Industrial	75.5
6	Agriculture	88.6
6	Core Greenland	1.1
6	Future Development	20.1
6	Highway Commercial	2.8
6	Residential	33.9



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TOWNSHIP OF WELLINGTON NORTH

SERVICING MASTER PLAN UPDATE

Sanitary Catchment Areas

DATE	PROJECT No.
Jan 14, 2011	08158
SCALE: 1: 18 000	FIGURE No. A-5

1.6 Areas of Future Development and Servicing

Table A-12 of this report outlined the future land requirements to accommodate growth-related activities in the study area. Given the need to provide municipal services to future development in an orderly and cost-effective manner, a plan was prepared for the 2003 Master Plan designating future growth areas based on future requirements for sanitary sewage and water servicing requirements, as well as future land use activities. In total, 10 Future Service Areas were identified for this study area. These areas were defined based on an evaluation of land use planning policies and future sanitary sewage requirements (i.e., anticipated drainage catchment areas). Figure A-6 illustrates the lands situated within each of the defined areas. The following provides a brief summary of each service area and updates the estimated land base required in each area to accommodate future development activities over the 20-year and 50-year planning periods. Information regarding the approximate size of future service areas and components of these areas has been updated from the 2003 Master Plan. The land base projections presented provide a general conception of future growth activities in the community. However, the forecasts are not definitive in nature and are only used to assist the preparation of long-term servicing plans for water supply and sanitary sewage collection.

Future Service Area 1 (Egremont Annexation Area)

Future Service Area 1 (FSA 1) is situated near the northeastern limit of Mount Forest, north of Sligo Road and east of Main Street. The area is located immediately north of Service Catchment Area 4 and is comprised of lands formerly within the Township of Egremont. For the purposes of this study FSA 1 has been further subdivided into Future Service Areas 1A and 1B. The former railway right-of-way represents the boundary between these two areas.

FSA 1A is comprised of those lands south of the former railway. This 38.4 ha area is primarily designated for industrial activities (28.9 ha), with 4.0 ha of land fronting Sligo Road being allocated for residential development and the remaining 5.6 ha of land being set aside for environmental protection. FSA 1B includes all lands north of the former railway right-of-way. This area is 93.4 ha in size, of which 78% (70.7 ha) is designated for industrial use. The remainder of the service area is proposed for highway commercial activity (6.1 ha) and environmental protection (14.4 ha).

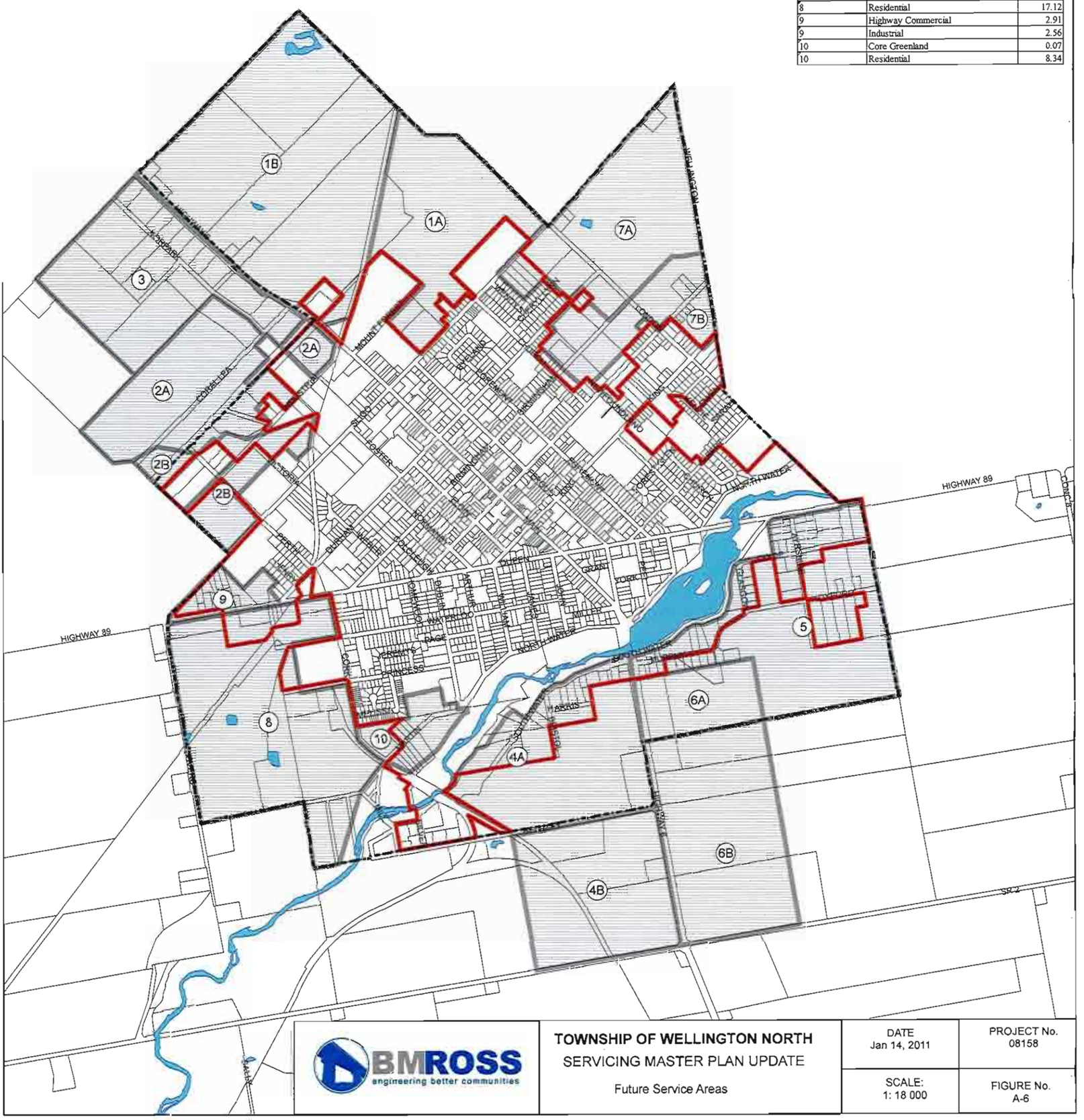
FSA 1A is expected to be among the first future servicing areas to be developed, given that servicing was recently extended east on Sligo Road to service the new high school. In general, the development of this area is expected to coincide with the land use activities prescribed by the Official Plan (i.e., residential development fronting Sligo Road, industrial development occurring at the rear of the property).

N

Legend

- Urban Centre Boundary
- Built Boundary
- Future Service Area

Service Area	OP Designation	Area (ha)
1A	Core Greenland	5.58
1A	Industrial	28.83
1A	Residential	3.98
1B	Core Greenland	14.47
1B	Highway Commercial	2.63
1B	Industrial	75.50
2A	Agriculture	24.56
2A	Core Greenland	4.19
2A	Highway Commercial	4.95
2A	Industrial	5.78
2B	Agriculture	1.45
2B	Industrial	12.48
3	Agriculture	5.04
3	Core Greenland	6.95
3	Highway Commercial	34.43
4A	Core Greenland	0.43
4A	Future Development	5.63
4A	Highway Commercial	2.77
4A	Residential	34.02
4B	Agriculture	40.68
5	Core Greenland	1.08
5	Future Development	23.14
5	Policy Area	14.16
5	Recreational	0.37
5	Residential	16.69
6A	Core Greenland	0.45
6A	Future Development	14.67
6A	Policy Area	0.02
6A	Residential	0.00
6B	Agriculture	50.50
6B	Future Development	0.16
7A	Core Greenland	2.82
7A	Future Development	29.97
7A	Residential	9.20
7B	Core Greenland	1.20
7B	Future Development	4.83
7B	Residential	12.23
8	Core Greenland	1.03
8	Future Development	40.26
8	Highway Commercial	4.54
8	Policy Area	4.32
8	Recreational	2.38
8	Residential	17.12
9	Highway Commercial	2.91
9	Industrial	2.56
10	Core Greenland	0.07
10	Residential	8.34



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TOWNSHIP OF WELLINGTON NORTH

SERVICING MASTER PLAN UPDATE

Future Service Areas

DATE	PROJECT No.
Jan 14, 2011	08158
SCALE: 1: 18 000	FIGURE No. A-6

FSA 1B, in contrast, is not anticipated to develop in the near future given that a considerable amount of serviced, industrial land is currently vacant along Industrial Drive and Mount Forest Drive. However, over the 50-year planning period, this area is expected to accommodate a more significant proportion of industrial growth. In this regard, it is assumed that municipal servicing may eventually be extended northerly along Highway 6 to service development activities in FSA 3 (West Grey lands). The availability of servicing within this corridor would facilitate industrial development on vacant designated lands in FSA 1B.

Table A-13 summarizes the land base required in FSA 1A and 1B to accommodate the growth forecasted for the study area.

Table A-13
Projected Land Requirements for Future Service Area 1

Service Area	Land Use	2011-2031	2031-2061	Total
1A	Industrial	21.5 ha	6.1 ha	27.6 ha
	Residential	4.4 ha	0 ha	4.4 ha
1B	Industrial	0 ha	70.6 ha	70.6 ha
	Commercial	6.1 ha	0 ha	6.1 ha
Total		32.1 ha	70.7 ha	102.8 ha

Future Service Area 2 (Normanby Annexation Lands)

Future Service Area 2 (FSA 2) is situated near the northwestern limit of the community, immediately north of Sligo Road and west of Main Street. The area encircles SCA 1 and is immediately north of SCA 2 and SCA 4. The service area includes lands within the existing Mount Forest Industrial Park and property that may be annexed from the Municipality of West Grey (lands formerly part of the Township of Normanby). FSA 2 has been subdivided into Future Service Areas 2A and 2B. The municipal drain crossing the Industrial Drive road allowance represents the boundary between the two areas.

FSA 2A is a 41.2 ha area situated immediately north of the drain. The large majority of FSA 2A (24.6 ha) is designated for agricultural activities. This farmland is expected to ultimately develop for industrial uses as part of the expansion of the industrial park. However, based upon current planning policy, it is assumed that these lands will not be re-designated until most vacant industrial property in the community is absorbed by development and annexation talks with West Grey are successful. Approximately 3.0 ha of FSA 2A is situated within the Industrial Drive corridor and designated for industrial uses.

FSA 2B is located south and west of the municipal drain and is 15.4 ha in size. This entire area is expected to develop for industrial purposes. However, industrial development in this area is anticipated to occur at a slower rate than FSA 2A.

Table A-14 summarizes the land base required in FSA 2A and 2B to accommodate the growth forecasted for the study area.

Table A-14
Projected Land Requirements for Future Service Area 2

Service Area	Land Use	2011-2031	2031-61	Total
2A	Industrial	6.1 ha	3.2 ha	9.3 ha
2B	Industrial	0 ha	6.1 ha	6.1 ha
Total		6.1 ha	9.3 ha	15.4 ha

Future Service Area 3 (West Grey Industrial Lands)

Future Service Area 3 (FSA 3) is comprised of those lands in the Municipality of West Grey directly north of the Township limits and immediately east of Provincial Highway 6. This 47.1 ha area is generally north of Sanitary Catchment Area 4 and is immediately west of FSA 1B. These lands are designated for highway commercial and agricultural uses. FSA 3 has been incorporated into the Mount Forest service area based upon the assumption that servicing may be extended to these lands at some point in the future. However these lands will be retained within the West Grey municipal boundaries.

Development within FSA 3 is currently comprised of a variety of light industrial and highway commercial activities on private services, as well as agricultural uses. In total, approximately 53% (24.5 ha) of this area is currently developed. The County of Grey Official Plan anticipates that 34.4 ha of land within this defined area will ultimately be utilized for highway commercial purposes.

Future Service Area 4 (Murphy Property)

Future Service Area 4 is situated south of the South Saugeen River, immediately west of Highway 6. The area is largely farmland; however, existing residential development on partial services is located adjacent to the river. A large woodlot also extends along the western limit of the service area. FSA 4 has been subdivided into Future Service Areas 4A and 4B. Bentley Street represents the boundary between the two areas.

FSA 4A is situated north of Bentley Street and has a land base of 47.2 ha. The largest parcel in the area, the Murphy property, is predominately designated for residential development. It is anticipated that this parcel will represent a key residential growth area in the community. Servicing of FSA 4A will be facilitated through the construction of the South Water Street SPS. A Class Environmental Assessment process was completed for the facility and a forcemain was recently installed beneath the South Saugeen River to connect the SPS to the Mount Forest sanitary collection system. A portion of land in the southeast corner of the site is also designated for highway commercial uses. The remainder of FSA 4A is designated for residential activities (7.9 ha), future development (5.7 ha) and environmental protection (0.4 ha). It is anticipated that the lands designated future development will ultimately be used for residential purposes.

FSA 4B is comprised of 41.6 ha of farmland immediately south of Bentley Street. In general, it is expected that these agricultural lands will ultimately develop for residential purposes. However, no growth is anticipated within the defined planning periods.

Table A-16 summarizes the land base required in FSA 4A to accommodate the growth forecasted for the study area.

Table A-16
Projected Land Requirements for Future Service Area 4

Service Area	Land Use	2011-2031	2031-61	Total
4A	Residential	13 ha	13.5 ha	26.5 ha
4A	Highway Commercial	3.6 ha	0 ha	3.6 ha
Total		16.6 ha	13.5 ha	30.1 ha

Future Service Area 5 (South of the Saugeen River/ East of Highway 6)

Future Service Area 5 is situated south of the South Saugeen River, immediately east of Highway 6. This 61.1 0 ha area is currently comprised of estate residential dwelling lots (i.e., large lots, municipal water services only, private sewage disposal) and agricultural activities.

With respect to Official Plan policies, FSA 5 is designated for residential activities (16.7 ha), special policy area (14.2, ha), future development (23.6 ha) and recreational/ core greenlands (1.5 ha). It is expected that the future developments lands will ultimately be used for estate residential development. In general, FSA 5 is anticipated to develop at a slow rate over the course of the defined planning periods. The availability of full municipal servicing is expected to be a major determinant in the ultimate development of this area.

Table A-17 summarizes the land base required in FSA 5 to accommodate growth forecasted for the study area.

Table A-17
Projected Land Requirements for Future Service Area 5

Land Use	2011-31	2031-2061	Total
Residential	0.4 ha	18.5 ha	18.9 ha

Future Service Area 6 (South of Murphy Street/ East of Highway 6)

Future Service Area 6 is situated in the southeast portion of the study area, immediately south of Murphy Street and immediately east of Highway 6. The lands within this 67.1 ha service area are currently used for agricultural purposes. FSA 6 has been subdivided into Future Service Areas 6A and 6B. The former Town of Mount Forest limit represents the boundary between the two areas.

FSA 6A is a 15.7 ha area situated north of the former Town limits. The area is designated for future development (14.8 ha), and environmental protection (0.4 ha). FSA 6B is a 51.4 ha farm parcel that is designated in the Official Plan for agricultural purposes. Based on discussions with local officials and developers, it is expected that FSA 6A and FSA 6B will develop in a similar fashion. Lands fronting Highway 6 will be used for highway commercial activities. The rear portion of both areas is expected to develop for residential purposes.

Over the 50-year planning period, growth pressures are only expected to require development in FSA 6A. Table A-18 summarizes the land base required within FSA 6A to accommodate future growth activities in the study area.

Table A-18
Projected Land Requirements for Future Service Area 6

Service Area	Land Use	2011-2031	2031-61	Total
6A	Residential	0 ha	4.3 ha	4.3 ha
6A	Highway Commercial	3.2 ha	0 ha	3.2 ha
Total		3.2 ha	4.3 ha	7.5 ha

Future Service Area 7 (London Road Area)

Future Service Area 7 includes virtually all property within the Township limits east of London Road, as well as all unserviced lands situated south of Sligo Road and immediately west of London Road. The majority of this 60.3 ha area is used for agriculture. FSA 7 has been subdivided into Future Service Areas 7A and 7B. The Birmingham Street extension generally represents the boundary between the two areas.

FSA 7A is a 42.0 ha area situated north of the Birmingham Street extension. FSA 7B is an 18.3 ha area located south of the street extension. Lands in both areas located west of London Road are designated Residential in the Official Plan. Lands in both service areas situated east of London Road are designated Future Development.

Based on discussions with local officials and developers, it is anticipated that those portions of FSA 7A and 7B located west of London Road will accommodate a large portion of new residential development in the community during the 2011-2031 planning period. As well, Future Development areas east of London Road are expected to develop for low density residential purposes in the latter half of the planning period. Development activity is not expected on lands in FSA 7A east of the Fairbanks Creek tributary. Table A-19 summarizes the land base required within FSA 7A and 7B to accommodate future growth activities in the study area.

Table A-19
Projected Land Requirements for Future Service Area 7

Service Area	Land Use	2011-2031	2031-61	Total
7A	Residential	2.6 ha	12.3 ha	14.9 ha
7B	Residential	9.1 ha	9.8 ha	18.9 ha
Total		11.7 ha	22.1 ha	33.8 ha

Future Service Area 8 (West of Cork Street/ South of Highway 89)

Future Service Area 8 is situated in the southwest corner of the study area. This 70.5 ha area is located immediately west of Sanitary Catchment Area 2. The area is largely vacant, with a limited amount of highway commercial and residential activity evident along Highway 89. There is also a cemetery located on the east side of Lovers Lane south of the former CNR railway line.

The Official Plan designates FSA 8 for residential, highway commercial, special policy area, recreational and future development activities. The residential and highway commercial lands generally front Highway 89, with future development lands located south of the highway and extending to the southern limit of the study area. At this time, it is anticipated that the majority of the future development lands will ultimately be used for residential purposes. The remainder of these lands may be set aside for environmental protection (being the municipal reforestation project).

Over 50 years, the majority of land immediately east of Cork Street is expected to develop for residential activities. A limited amount of highway commercial development is also expected to occur along Highway 89 during the defined planning periods. Table A-20 summarizes the land base required within FSA 8 to accommodate future growth activities in the study area.

Table A-20
Projected Land Requirements Uses for Future Service Area 8

Land Use	2011-2031	2031-61	Total
Residential	0 ha	12.9 ha	12.9 ha
Highway Commercial	3.3 ha	0 ha	3.3 ha
Total	3.3 ha	12.0 ha	16.2 ha

Future Service Area 9 (North of Highway 89/ South of Sligo Road)

Future Service Area 9 is a relatively small service area (5.5 ha) situated near the western boundary of the study area and immediately west of Sanitary Catchment Area 2. The area currently includes a mixture of industrial, residential, and commercial uses which front Sligo Road and Highway 89. FSA 9 represents the only development area which is entirely within the existing developed area. The Official Plan designates FSA 9 for highway commercial and industrial activities. Approximately 2.9 ha of land fronting Highway 89 is designated for highway commercial uses. The remaining 2.6 ha of land fronts on Sligo Road and is designated for industrial purposes.

In general, FSA 9 is not anticipated to be an area of significant highway commercial or industrial growth over the defined planning periods. This is due to the fact that a considerable amount of existing residential development currently exists in the area.

Future Service Area 10 (Martin Street Area)

Future Service Area 10 is a small service area (9.7 ha) which is situated between the South Saugeen River and Sanitary Catchment Area 2. The area currently accommodates a number of residential estate dwellings which front Martin Street. The Official Plan designates FSA 10 for residential activities. FSA 10 is expected to develop as a low density or moderate-density residential area, predominately within the 2011-2031 planning period. Table A-22 summarizes the land base required in FSA 10 to accommodate growth forecasted for the study area.

Table A-22
Projected Land Requirements for Future Service Area 10

Land Use	2011-2031	2031-61	Total
Residential	6.6 ha	0 ha	6.6 ha

1.7 Summary of Future Land Requirements

Table A-23 summarizes the estimated land required in each Future Service Area to accommodate future development over the 20-year and 50-year planning periods.

Table A-23
Additional Land Requirements for Future Service Areas

FSA	Total Area	Land Use	2011-2031	2031-2061	Total
IA	38.4 ha	Industrial	21.5 ha	6.1 ha	27.6 ha
		Residential	4.4 ha	0 ha	4.4 ha
IB	93.4 ha	Industrial	0 ha	70.6 ha	70.6 ha
		Highway Commercial	6.1 ha	0 ha	6.1 ha
2A	41.2 ha	Industrial	6.1 ha	3.2 ha	9.3 ha
2B	15.4 ha	Industrial	6.1 ha	0 ha	6.1 ha
3	47.1 ha	Highway Commercial	0 ha	0 ha	0 ha
4A	47.2 ha	Residential	13.5 ha	13 ha	26.5 ha
		Highway Commercial	3.6 ha	0 ha	3.6 ha
5	61.1 ha	Residential	0.4 ha	18.5 ha	18.9 ha
6A	15.7 ha	Residential	0 ha	4.3 ha	4.3 ha
		Highway Commercial	3.2 ha	0 ha	3.2 ha
6B	51.4 ha	Residential	0 ha	3.6 ha	3.6 ha
		Highway Commercial	0 ha	3.6 ha	3.6 ha
7A	44.0 ha	Residential	2.6 ha	12.3 ha	14.9 ha
7B	20.1 ha	Residential	9.1 ha	9.8 ha	18.9 ha
8	70.5 ha	Residential	0 ha	12.9 ha	12.9 ha
		Highway Commercial	3.3 ha	0 ha	3.3 ha
9	6.8 ha	Industrial	0 ha	0 ha	0 ha
10	9.7 ha	Residential	6.6 ha	0 ha	6.6 ha
Total	**562 ha**		**86.5 ha**	**157.9 ha**	**244.4 ha**

APPENDIX B
SUMMARY OF WATER DISTRIBUTION SYSTEM MODELING TO DATE

Summary of Water Distribution System Modeling to Date (August 2010)

1. Introduction

As part of the analysis undertaken for the original 2003 Mount Forest Master Plan, a WaterCAD model of the community's water distribution system was created. As part of the 2011 Master Plan update, the existing WaterCAD model was revised to include works that have been constructed since 2003, and update current water demands in the community. There are two main purposes for the model:

- To identify problems within the existing distribution system
- To identify system requirements to service new development areas, including:
  - Identifying changes to existing system required to meet new service requirements
  - Establishing the estimated size of new trunk watermains required to meet the needs of new service areas
  - Evaluating water storage expansion requirements

2. Existing Conditions

2.1. System Details

The existing water distribution system in Mount Forest uses four wells, with various capacities. The well pump capacities, as of August 2010, are summarized in Table 2.1. Each well pump is currently operated at less than the rated capacity.

Table 2.1
Well Pump Capacities

Well	Pump Rated Capacity	Pump Head	Actual Capacity [1]
3	22.7 L/s (1,920 m^3/d)	71.3 m. TDH	under 15 L/s [2]
4	22.7 L/s (1,920 m^3/d)	83.2 m TDH	16.3 L/s
5	45.5 L/s (3,849 m^3/d)	69.5 m TDH	35.26 L/s
6	45.5 L/s (3,849 m^3/d)	92.7 m TDH	25.1 L/s [3]
Total	136.4 L/s (11,785 m^3/d)		91.66 L/s
firm capacity	90.9 L/s (7,854 m^3/d)		< 56.4 L/s [4]

Notes:

1. All wells have been throttled so as not to exceed their permitted capacity.
2. Due to well needing rehabilitation. In December 2010, rehabilitation work was completed on this well. Preliminary observations indicate that the actual capacity of Well No. 3 as of January 2011 is approximately 21 L/s. The capacity of 15 L/s was used for all model calculations.
3. Throttled back due to sulphide issues.
4. Assumes a Well No. 3 capacity of less than 15 L/s. Based on Note 2., the firm capacity of the supply system may now be 62.4 L/s. A firm capacity of 56.4 L/s was used for all model calculations.

The four wells are operated with the well pump rotation sequences summarized in Table 2.2.

Table 2.2
Well Pump Rotation Sequences

	First Sequence	Second Sequence	Third Sequence	Fourth Sequence
Lead Pump	3	6	4	5
1st Lag Pump	5	3	6	4
2nd Lag Pump	4	5	3	6
3rd Lag Pump	6	4	5	3

Mount Forest has a 2,083 m^3 standpipe, TWL = 461.40 mASL, located at the well 3 site. In 2007, a booster pumping station was constructed at the base of the standpipe. The booster pump has a rated capacity of 215 L/s @ 30 m TDH. The booster pump is called to start based upon water level in the standpipe. The start water level is normally set below the well pump start levels, so that all well pumps will be operating prior to the booster pump being called to start.

As standpipe liquid levels fall, the well pumps are turned on sequentially. Table 2.3 shows the start well pump trigger levels.

Table 2.3
Well Pump Operating Setpoints

Duty Pump	Standpipe Water Level (m)[1]	
	Start	Stop
Lead Well Pump	32.6	33.5
1st Lag Pump	32.0	33.5
2nd Lag Pump	31.4	33.5
3rd Lag Pump	30.8	33.5

Notes:
1. As measured below the base of the standpipe from a connection within a valve chamber location adjacent to the base of the standpipe.

The water distribution system information was taken from the 2003 WaterCAD model, and revised to incorporate new works that have been constructed since the creation of the 2003 model. The Township operations staff reviewed the overall watermain plan and provided information to correct errors or omissions in the model. The information for new works (e.g., watermain diameter and length, pressure junction elevations) was taken from As-Recorded records from BMROSS and other consultants that have designed works. Pipe C-factors for new watermain were assumed to be as follows, in accordance with MOE Design Guidelines:

- 100 & 150 mm dia. C-factor of 100
- 200 & 250 mm dia. C-factor of 110
- 300+ mm dia. C-factor of 120

For older watermain, a C-factor of 80 was generally used, based on BMROSS experience with other similar types of municipal water systems in Ontario.

2.2. Average Day Scenario

2.2.1. Average Day Flow Analysis

Average day demand was set at 17.42 L/s, which is the 3-year average of known well pumpages (2007-2009). This is approximately 30% lower than at the time of the last Master Plan. Possible reasons for the decrease are:

- Closure of a number of manufacturers including a casket factory, a basket factory and Acme Ruler.
- Rate changes as follows:
    1. In 2003 rates for metered usage were $1.11/m3 up to 2,272 m3, any usage after that was rated at $0.55/m3.
    2. Current rates are now $1.34/m3, no discount for higher users.
- Metering of ICI customers, majority of them were metered in 2006.
- Tougher lawn water restrictions came into effect.
- General public more aware of conservation efforts.
- Leak detection program in place.
- Better maintenance system in place since change in operational staff in 2003.

Overall System Water Use

- Average day = 1,503 m^3/d = 17.42 L/s
- 2006 Population = 4,750 (estimate)
- Per capita use = 0.316 $m^3/ca/d$ = 316 L/ca/d
- MOE recommendation of 270 - 450 L/ca/d

Industrial Use (records from 14 customers used in model)

- Range of use (from metered users) is 0.58 $m^3/ha/d$ (Wellington Wood Products) to 23.84 $m^3/ha/d$ (W-S Feed & Supplies)
- Total water use by metered industrial customers in 2009 = 24,855 m^3
- Total land area of metered industrial customers in 2009 = 24.5 ha
- Avg. of each industry usage rate = 5.33 $m^3/ha/d$
- Weighted Avg. of each industry usage rate[1] = 11.56 $m^3/ha/d$
- MOE recommendation of 35-55 m^3/gross ha/d

Commercial Use (records from 137 customers used in model)

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[1] The weighted average for each ICI category was calculated using the following formula:

$$\sum_{i=1}^{n} \frac{w_i}{w_T} \times r_i$$

w_i = annual water use by user i (m^3)
w_T = total annual water use by all users (m^3)
r_i = water usage rate by user I ($m^3/ha/d$)
n = total number of users in the ICI category

- Range of use is 0.01 m^3/ha/d (Dwight and Catherine Benson) to 412.64 m^3/ha/d (Mount Forest IGA)
- Total water use by metered commercial users in 2009 = 62,763 m^3
- Total land area of metered commercial users in 2009 = 46.4 ha
- Avg. of each commercial usage rate = 14.75 m^3/ha/d
- Weighted Avg. of each commercial usage rate = 105.67 m^3/ha/d
- MOE recommendation of 28 m^3/ha/d for commercial and tourist-commercial

Institutional (records from 15 customers used in model)

- Range of use is 1.74 m^3/ha/d (Mount Forest Curling Club) to 78.11 m^3/ha/d (Saint Mary's Church)
- Total water use by metered institutional users in 2009 = 70,343 m^3
- Total land area of institutional users in 2009 = 10.3 ha
- Avg. of each institutional usage rate = 20.45 m^3/ha/d
- Weighted Avg. of each institutional usage rate = 31.91 m^3/ha/d
- MOE does not have give an overall recommendation for non-metered institutions, as use would vary considerably between institution types.

Usage Rates applied in Model

- All known usage rates, which could be readily applied to specific locations throughout the system and assigned to a specific ICI grouping, were included. This includes most (i.e., approximately 90%) of metered industrial, commercial, and institutional (ICI) customers. All usage that is not metered at the customer property was considered to be residential.
- Model nodes were assigned on a parcel area based on surrounding lots likely to be serviced from each node. Each parcel area was divided into ICI and non-ICI (i.e., residential) use.
- ICI demands were applied to relevant nodes in the model.
- Residential demands were applied as follows:
    - Total average day usage – ICI metered usage = non-metered usage
        - 17.42 - 6.26 = I1.16 L/s
    - Assumed that the total residential demand is divided evenly, by area, over all residential development within the town

Table 2.4, shows the ICI metered usage for 2009

Table 2.4
Nodes and Usage Rates by Area for ICI Metered Users

Industrial

User	Location	2009 Usage (m3/year)	Parcel Area (ha)	Usage Rate (m3/ha/d)
LONG MANUFACTURING LTD	205 INDUSTRIAL DR	10,359	1.786	15.89
W-S FEED & SUPPLIES LIMITED	535 QUEEN ST W	3,628	0.417	23.84
SOLOWAVE DESIGN INC	375 SLIGO RD W	2,807	4.795	1.60
VINTEX INC	1 MT FOREST DR	1,664	6.901	0.68
ISHAN PATEL INC	284 MAIN ST N	1,470	0.259	15.55
VIKING-CIVES	555 PERTH ST	1,218	2.035	0.68
WASTE MANAGEMENT OF CANADA	400 INDUSTRIAL DR	1,011	1.785	1.55
WELLINGTON WOOD PRODUCTS	410 SLIGO RD W	781	3.688	0.58
ACME UNITED LIMITED	351 FOSTER ST	642	1.050	1.67
DDR AMERICAS INC	183 DURHAM ST W	603	0.434	3.80
STREAMLINE AUTO BODY LTD	181 DURHAM ST W	240	0.210	3.13
WM DINGWALL INDUSTRIES	248 MAIN ST N	148	0.103	3.94
WELLINGTON NORTH MACHINE	218 INDUSTRIAL DR	145	0.660	0.60
ARBRO CONCRETE FORMING LTD	570 PERTH ST	139	0.345	1.10
AVERAGE				**5.33**
TOTAL		**24,854**	**24.47**	

Commercial

User	Location	2009 Usage (m3/year)	Pareel Area (ha)	Usage Rate (m3/ha/d)
MOUNT FOREST IGA	121 MAIN ST S	13,103	0.087	412.64
TIM HORTON'S DONUTS	319 MAIN ST S	2,432	0.248	26.86
MOUNT FOREST CAR WASH	391 MAIN ST N	2,158	0.283	20.89
Y K LEUNG & X T QIAN	393 MAIN ST N	2,121	0.250	23.24
MOUNT ROYAL TAVERN	187 MAIN ST S	2,117	0.402	14.43
1507829 ONTARIO INC	261 MAIN ST S	2,009	0.250	22.01
1412880 ONTARIO LTD	235 MAIN ST S	1,957	0.118	45.43
KEN LEARY & SONS DRY CLEANING	140 ELGIN ST S	1,927	0.205	25.75
ROYAL CANADIAN LEGION	140 KING ST W	1,472	0.095	42.44
H BYE CONSTRUCTION	395 CHURCH ST N	1,446	1.191	3.33
A & W - MOUNT FOREST	618 MAIN ST N	1,431	0.354	11.07
BRIAN COLLINS	285 MAIN ST S	1,382	0.016	236.70
NO FRILLS	504 MAIN ST N	1,350	3.053	1.21
MT FOREST GREENHOUSE	460 DURHAM ST E	1,186	2.366	1.37
JOE LEDO	189 MAIN ST N	1,076	0.103	28.61
2079777 ONTARIO IN	169 MAIN ST N	965	0.295	8.96
BILL CHESTER	141 MAIN ST N	865	0.094	25.20
1339774 ONTARIO INC	234 MAIN ST S	810	0.118	18.81
DON CHERRY	165 MAIN ST S	780	0.144	14.84
NORMAN STEWART	180 MURPHY ST	768	5.036	0.42
SCOTTS PIZZA BURGER	286 MAIN ST N	723	0.117	16.92
1175102 ONTARIO CORP	122 MAIN ST S	677	0.087	21.31

User	Location	2009 Usage (m3/year)	Parcel Area (ha)	Usage Rate (m3/ha/d)
JOHN & SANDRA MAAS	121 MAIN ST N	649	0.048	37.05
ERIKA BANTING	134 MAIN ST S	582	0.122	13.08
RAMOTH LIFE CENTRE	119 WELLINGTON ST W	542	0.135	11.00
PADFIELD-NELSON INSURANCE	149 MAIN ST S	515	0.020	70.49
1530999 ONTARIO LIMITED	271 MAIN ST S	506	0.144	9.63
1024049 INVESTMENT LTD	229 MAIN ST S	501	0.059	23.24
TORONTO DOMINION BANK - 3064	174 MAIN ST S	475	0.089	14.62
T MARKSTAHLER & M E HAYDEN	129 WELLINGTON ST E	470	0.015	85.83
G & D MACDONALD HARDWARE	117 MAIN ST N	432	0.032	36.95
DAVID MACLACHLAN	490 QUEEN ST W	403	0.207	5.33
MAIN PETROLEUM INC/PETRO CAN	310 MAIN ST S	394	0.160	6.75
OTTO E RENELT	142 MAIN ST N	387	0.017	62.40
LOUISE BELLI	245 MAIN ST S	382	0.045	23.23
142200 ONTARIO REALTY	630 MAIN ST N	381	0.951	1.10
PIZZA DELIGHT	392 MAIN ST N	375	0.382	2.69
ADELL'S BEAUTY SALON	150 KING ST E	371	0.024	42.40
PAULA & MICK TALPA	157 MAIN ST N	365	0.134	7.46
MAC'S CONVENIENCE STORES	301 MAIN ST S	349	0.111	8.62
KATHLEEN TAYLOR	360 MAIN ST N	343	0.155	6.07
CARL STERRITT	181 MAIN ST S	342	0.061	15.37
FOREST PHYSIOTHERAPY	190 MAIN ST S	320	0.065	13.50
N WELLINGTON ANIMAL HOSP	248 MAIN ST S	315	0.211	4.09
PLUME'S MAIN ST INTERIORS	178 MAIN ST N	307	0.071	11.83
CANADIAN TIRE 66	525 QUEEN ST W	301	0.916	0.90
MILOR CLEANING SERVICE	129 BIRMINGHAM ST W	294	0.053	15.20
HODGINS LUMBER LIMITED	300 ARTHUR ST	292	0.312	2.56
CYNTHIA & CO	154 MAIN ST S	289	0.024	33.00
VON CANADA	392 MAIN ST N	288	0.382	2.07
REEVES CONSTRUCTION	372 MAIN ST N	282	0.313	2.47
GERRI BURT	480 WATERLOO ST	282	0.149	5.18
MOUNT FOREST BOWLING CENTRE	350 FOSTER ST	281	0.353	2.18
SCOTIABANK #25346	202 MAIN ST S	275	0.044	17.12
DEB'S GIFT SHOP	253 MAIN ST S	270	0.017	43.55
JJ MCLELLAN & SON	695 QUEEN ST W	264	0.137	5.29
JANICE LEWIS TRINCHI	178 MAIN ST S	257	0.097	7.25
DERYCK WEST STATE FARM	125 KING ST W	256	0.013	54.04
TOWN CONVENIENCE	242 MAIN ST S	243	0.072	9.26
BDO WARD-MALLETTE	191 MAIN ST S	241	0.047	14.03
MARCIA CAPELL	165 KING ST W	228	0.086	7.26
TANFIELD-PECK	110 MAIN ST N	217	0.015	39.67
LOCK N GO STORAGE INC	221 MAIN ST S	216	0.063	9.38
DOREEN AND BEV MATTHEWS	106 MAIN ST S	213	0.083	7.01
ANN WHITE	157 ELGIN ST S	200	0.100	5.49
HENDRICK FUNERAL HOME	294 MAIN ST S	200	0.105	5.22
WIGHTMAN COMMUNICATION LTD	392 MAIN ST N	199	0.382	1.43
1668971 ONTARIO INC	209 MAIN ST N	198	0.126	4.29

User	Location	2009 Usage (m3/year)	Parcel Area (ha)	Usage Rate (m3/ha/d)
KEN DEWAR/DEWAR SERVICES	1 VICTORIA ST	179	1.771	0.28
PULGUKSA RESTAURANT	103 MAIN ST N	177	0.021	23.07
DWIGHT RUNDLE	455 WELLINGTON ST E	173	1.745	0.27
JAMES MCPHERSON (JIM)	101 MAIN ST N	170	0.104	4.48
MOUNT FOREST CONVENIENCE	193 MAIN ST N	168	0.208	2.22
LISTOWEL-MOUNT FOREST VET PRO	322 MAIN ST N	159	0.202	2.16
HFI SERVICES INC	350 DUBLIN ST	150	0.536	0.77
DOUG & JEANNETTE JAMIESON	130 MAIN ST N	146	0.031	12.88
OFFICER'S AUTO CARE	210 INDUSTRIAL DR	131	0.663	0.54
YOUNG'S HHBC	525 MAIN ST N	121	2.310	0.14
GRECH OUTDOORS INC	153 MAIN ST S	119	0.023	14.12
BOSS VIDEO	153 MAIN ST S	116	0.023	13.85
SHOPPER'S DRUG MART-1001	129 MAIN ST S	114	0.106	2.96
DEVERELL & LEMAICH LPP	166 MAIN ST S	110	0.027	11.19
THE TRAIN CELLAR CLASSIC TRAIN	130 MAIN ST N	109	0.031	9.62
S & T TELFER MERCHANDISING LTD	525 QUEEN ST W	108	0.916	0.32
KINGDOM HALL	580 QUEEN ST W	102	0.649	0.43
TRELLIS MENTAL HEALTH	392 MAIN ST N	99	0.382	0.71
CANADA POST, BLDG 401935	170 WELLINGTON ST W	91	0.200	1.25
MT FOREST MOTORS	198 MAIN ST N	91	0.283	0.88
ROBERT & KAREN REGAN	190 SLIGO RD W	90	0.195	1.27
ALEX WILSON SURVEYING INC	120 KING ST E	85	0.055	4.22
THE OLD ROXY THEATRE	116 MAIN ST N	84	0.051	4.53
COOKS GARAGE	380 MAIN ST S	83	0.144	1.59
BARGAIN MART VARIETY	101 MAIN ST S	83	0.025	9.08
BARGAIN MART VARIETY/HANNA'S	101 MAIN ST S	82	0.025	9.01
COUNTRY CREATIONS	125 QUEEN ST E	80	0.289	0.76
MOUNT FOREST COMPUTERS	154 MAIN ST N	79	0.046	4.69
BMO 0345	201 MAIN ST S	76	0.153	1.36
IDEAL LADIES WEAR	237 MAIN ST S	68	0.076	2.45
CHRIS EVAGELELIS	301 MAIN ST S	67	0.111	1.66
ROYAL CITY AMBULANCE SERVICE	392 MAIN ST N	63	0.382	0.45
BENDER CONSTRUCTION	223 INDUSTRIAL DR	61	0.365	0.45
PEOPLE'S CHIROPODY CLINIC	160 KING ST W	57	0.134	1.17
TRACIE STRATHY KIOSK	504 MAIN ST N	51	3.053	0.05
2125065 ONT LTD BARGAIN MART	101 MAIN ST S	51	0.025	5.58
LEASK'S TIRE SALES	780 WATERLOO ST	50	0.813	0.17
MEAT THE BUTCHER	157 MAIN ST S	49	0.022	6.06
THE BEER STORE FACILITY 4106	429 MAIN ST N	45	1.901	0.07
ROBERT & ALETHA MCARTHUR	211 BIRMINGHAM ST W	43	0.086	1.37
GORMER RENTALS	410 YORK ST	41	0.415	0.27
JAMES MCPHERSON SR	101 MAIN ST N	41	0.104	1.07
BM ROSS AND ASSOCIATES	206 INDUSTRIAL DR	38	0.392	0.27
NOSTALGIC WOOD, INC	565 PERTH ST	37	1.286	0.08
RON VANLEEUWEN	286 MAIN ST S	35	0.143	0.66
COBURN INSURANCE BROKERS LTD	114 MAIN ST S	34	0.061	1.54

User	Location	2009 Usage (m3/year)	Parcel Area (ha)	Usage Rate (m3/ha/d)
YAKE ELECTRIC	214 INDUSTRIAL DR	31	0.356	0.24
DR SIMON GOODALL	170 ELGIN ST N	29	0.099	0.80
CHAMBER OF COMMERCE	514 MAIN ST N	28	0.187	0.41
JAY & LISA HODDER	160 MAIN ST N	26	0.066	1.08
DEREK & MAGGIE MOORE	249 MAIN ST S	25	0.026	2.62
RALPH REEVES & LEE TEMPLE	224 MAIN ST N	24	0.046	1.40
DR MURRAY TOWNSEND	146 MAIN ST S	23	0.033	1.87
PATTI MCMILLAN	150 MAIN ST S	22	0.017	3.59
JOHN RIDGEWAY	250 ELGIN ST N	19	0.144	0.37
LCBO	195 KING ST W	16	0.104	0.43
NEXACOR REALTY MANAGEMENT	285 EGREMONT ST N	16	0.186	0.24
DMA DISTRIBUTING	580 PERTH ST	12	0.477	0.07
MIKE & JEANNIE BOYLAN	160 MAIN ST N	11	0.066	0.46
DAVID REEVES	240 MAIN ST S	10	0.034	0.80
COUNTRY CARPET/L OAKES	135 MAIN ST N	8	0.226	0.10
DARREN & ANGELA SCHENK	321 MAIN ST N	6	0.133	0.13
ST ALBANS LODGE	145 FERGUS ST S	3	0.101	0.07
BEARRY INC	183 DURHAM ST W	1	0.434	0.01
DWIGHT AND CATHERINE BENSON	202 INDUSTRIAL DR	1	0.249	0.01
KENNETH & JO-ANN GREENE	240 MAIN ST S	1	0.034	0.06
NEDCAN AUTO LTD	202 INDUSTRIAL DR	1	0.249	0.01
SOCHON HOLDINGS INC	392 MAIN ST N	0	0.382	0.00
LINDA RYAN	115 FERGUS ST S	0	0.093	0.01
AVERAGE				
TOTAL		**62,763**	**46.38**	**14.64**

Institutional

User	Location	2009 Usage (m3/year)	Parcel Area (ha)	Usage Rate (m3/ha/d)
UPPER GRAND DIST SCHOOL BOARD	355 DURHAM ST W	20,142	3.611	15.28
NORTH WELLINGTON HEALTH CARE	525 DUBLIN ST	12,891	0.757	46.65
SAUGEEN VALLEY NURSING	465 DUBLIN ST	10,390	0.475	59.93
BIRMINGHAM RETIREMENT COMM INC	356 BIRMINGHAM ST E	9,626	0.720	36.63
WELL & GUELPH HOUSING	450 ALBERT ST	6,457	1.008	17.55
WELL CTY SEPARATE SCHOOL	390 PARKSIDE DR	2,648	1.009	7.19
SAINT MARY'S CHURCH	336 PARKSIDE DR	2,252	0.079	78.11
CURVE ROCK CONDOMINIUMS	401 BIRMINGHAM ST E	2,018	0.688	8.04
MCFARLANE HEALTH FACILITY	392 MAIN ST N	1,968	0.382	14.12
MOUNT FOREST CHILD CARE CENTRE	455 DUBLIN ST	688	0.438	4.30
UNITED CHURCH	175 QUEEN ST E	370	0.266	3.82
MT FOREST CURLING CLUB	144 EGREMONT ST S	229	0.361	1.74
WELLINGTON COUNTY LIBRARY	118 MAIN ST N	222	0.321	1.89
FIRST BAPTIST	170 WELLINGTON ST E	222	0.089	6.82
SAUGEEN FITNESS & SPA	236 MAIN ST N	220	0.130	4.64
AVERAGE				
TOTAL		**70,342**	**10.33**	**20.45**

2.2.2. Model Calibration

The average day scenario was used to calibrate the model. The Township provided static pressure measurements, taken in 2008, at hydrant locations throughout Mount Forest. The pressure measurements were compared to the theoretical results obtained from the model. For the 70 nodes evaluated, the absolute difference between the measured pressure and the theoretical pressure from the model averaged 3 PSl (20 kPa), which represent an average of approximately 5% difference. Generally, these results indicate that the model assumptions are reasonable.

2.2.3. Scenario Details and Results

An average day scenario was run using the following details:

- All well and booster pumps off
- Storage TWL = 461.40 mASL
- Standpipe liquid level = 460.5 mASL (start level of lead well pump)

As expected, there were no pressure problems with this scenario. The area near the standpipe, and to the east/northeast, have pressures as low as 310 kPa, which is below the MOE Design Guidelines normal operating pressure range of 350 to 480 kPa.

2.3. Maximum Day Scenario

Maximum day peaking factors of 1.28 to 2.09 were calculated from 3 years of average day and maximum day usages. A peaking factor of 2.0 was used, in accordance with MOE Design Guidelines for the serviced population.

Four pumping scenarios were considered in accordance with the well pump rotation sequences currently used. All combinations were selected so that the maximum day demand was supplied by the wells. Combinations used were as follows:

- Wells 3 and 5 on; wells 4 and 6 off
- Wells 6 and 3 on; wells 5 and 4 off
- Wells 4 and 6 on; wells 3 and 5 off
- Wells 5 and 4 on; wells 6 and 3 off

Standpipe liquid level was set at 459.9 mASL (level when 1st lag pump turns on).

The results were similar to the average day scenario model runs.

2.4. Peak Rate Scenario

A peak rate peaking factor of 3.0 was used, in accordance with MOE Design Guidelines for the serviced population.

Four pumping scenarios were considered in accordance with the well pump rotation sequences currently used. All combinations were selected so that the peak rate demand was supplied by the wells. Combinations used were as follows:

- Wells 3, 5 and 4 on; well 6 off
- Wells 6, 3 and 5 on; well 4 off
- Wells 4, 6 and 3 on; well 5 off
- Wells 5, 4 and 6 on; well 3 off

Standpipe liquid level set at 459.3 mASL (level when 2nd lag pump turns on).

The results were similar to the average day scenario model runs.

2.5. Maximum Day Plus Fire

Fire flow analysis was carried out using the following assumptions:

- Max day demand of approximately 35 L/s. ($\approx$ 2 x 17.24 L/s)
- 50 L/s fire flow rate for residential areas.
- 150 L/s fire flow rate for industrial and institutional areas.
- 225 L/s fire flow rate for downtown commercial areas.
- The bottom elevation of equalization storage in the standpipe was assumed to be the third well pump start level of 459.3 mASL, because three well supplies have a capacity greater than the calculated existing service population peak demand rate.
- The bottom elevation of residential fire storage in the standpipe was assumed to be 456.4 mASL, calculated as follows:
    - Max day (35 L/s) + fire demand (50 L/s) = 85 L/s
    - Current (August 2010) firm well supply capacity = 56.4 L/s
    - Net fire flow from storage = 85 – 56.4 = 28.6 L/s
    - 28.6 L/s for 2 hours = 206 m^3
    - Cross-sectional area of standpipe = 70.9 m^2
    - 206/70.9 = 2.90 m
    - 459.3 – 2.90 = 456.4 mASL
- The bottom elevation of industrial/institutional fire storage in the standpipe was assumed to be 446.24 mASL, calculated as follows:
    - Max day (35 L/s) + fire demand (150 L/s) = 185 L/s
    - Current (August 2010) firm well supply capacity = 56.4 L/s
    - Net fire flow from storage = 185 – 56.4 = 128.6 L/s
    - 128.6 L/s for 2 hours = 926 m^3
    - Cross-sectional area of standpipe = 70.9 m^2
    - 926/70.9 = 13.06 m
    - 459.3 – 13.06 = 446.24 mASL
- The bottom elevation of downtown commercial core fire storage in the standpipe was assumed to be 438.63 mASL, calculated as follows:
    - Max day (35 L/s) + fire demand (225 L/s) = 260 L/s
    - Current (August 2010) firm well supply capacity = 56.4 L/s
    - Net fire flow from storage = 260 – 56.4 = 203.6 L/s
    - 203.6 L/s for 2 hours = 1,466 m^3

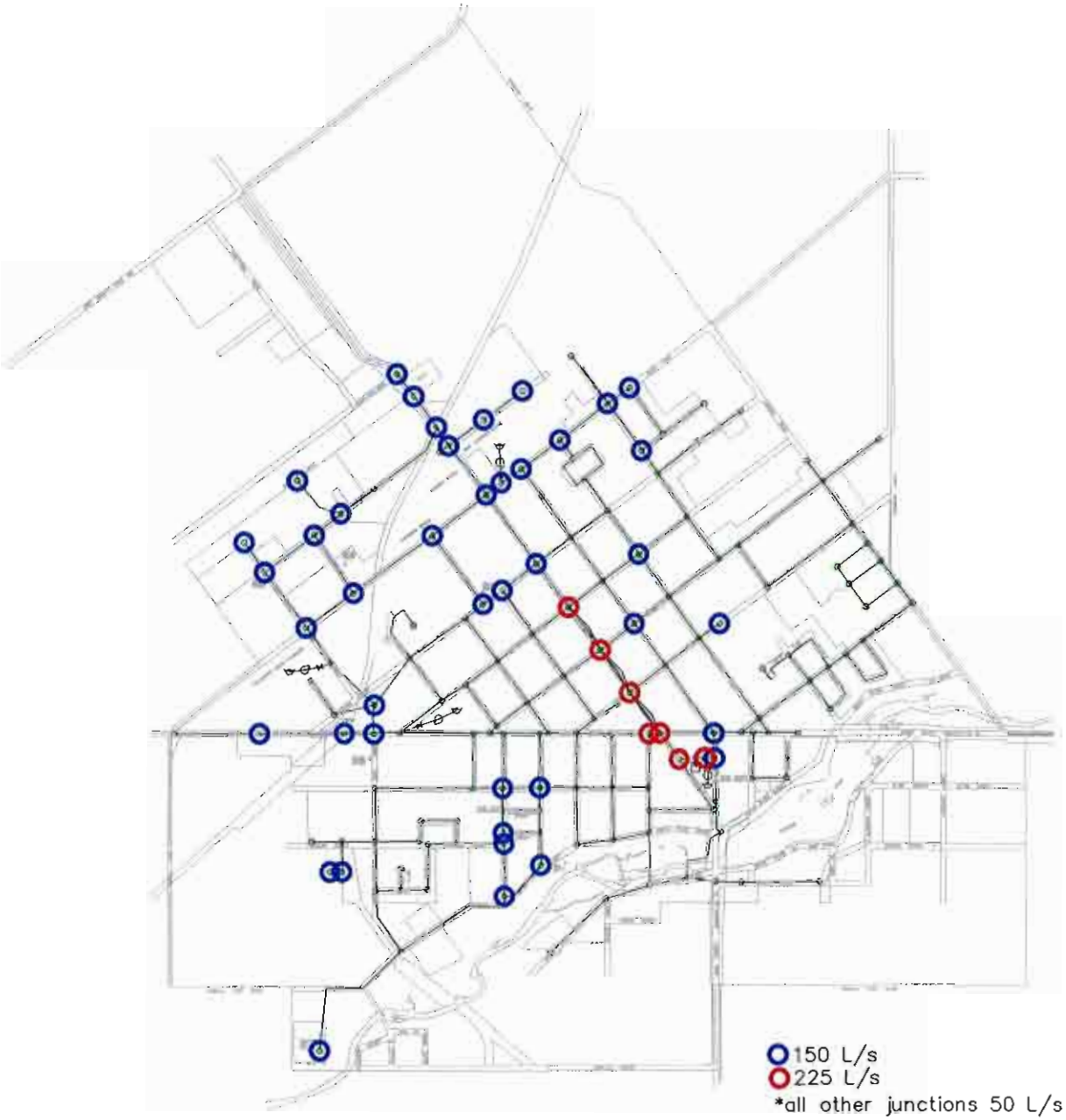
  - Cross-sectional area of standpipe = 70.9 m^2
  - 1,466/70.9 = 20.67 m
  - 459.3 – 20.67 = 438.63 mASL
- The booster pumping station at the standpipe was designed to discharge water at an HGL of 455.0 mASL. Because the bottom of storage elevation, for the industrial/institutional and downtown commercial core fire scenarios, is below 455.0 mASL, the fire flow analysis for these scenarios assumed a HGL of 455.0 mASL at the standpipe location.

The system locations evaluated for the above fire flow rates, as applicable, are shown in Figure 2.1.

It is noted that the evaluation is based on measuring the capability of the transmission mains to deliver the required fire flow rate to each point in the distribution system. The actual amount of flow available may be reduced due to a number of reasons, including the size and number of hydrants in the vicinity of the junctions evaluated.

The modeling applied the standpipe liquid level at the end of the assumed 2 hour fire flow demand, which will be the lowest fire flow available. During initial fire flow periods, the available flow is greater than that modeled. For some identified problem areas, fire flows may be acceptable at/near the start of the fire event, but due to the relatively rapid decline in the standpipe liquid level during ICI or downtown fire events, the desired fire flow rate can only be maintained for a limited period of time that is less than 2 hours.

There are locations where, it appears, target fire flow rates will not be achievable, based on the established model. The existing problem areas are shown in Figure 2.2. The following is noted:



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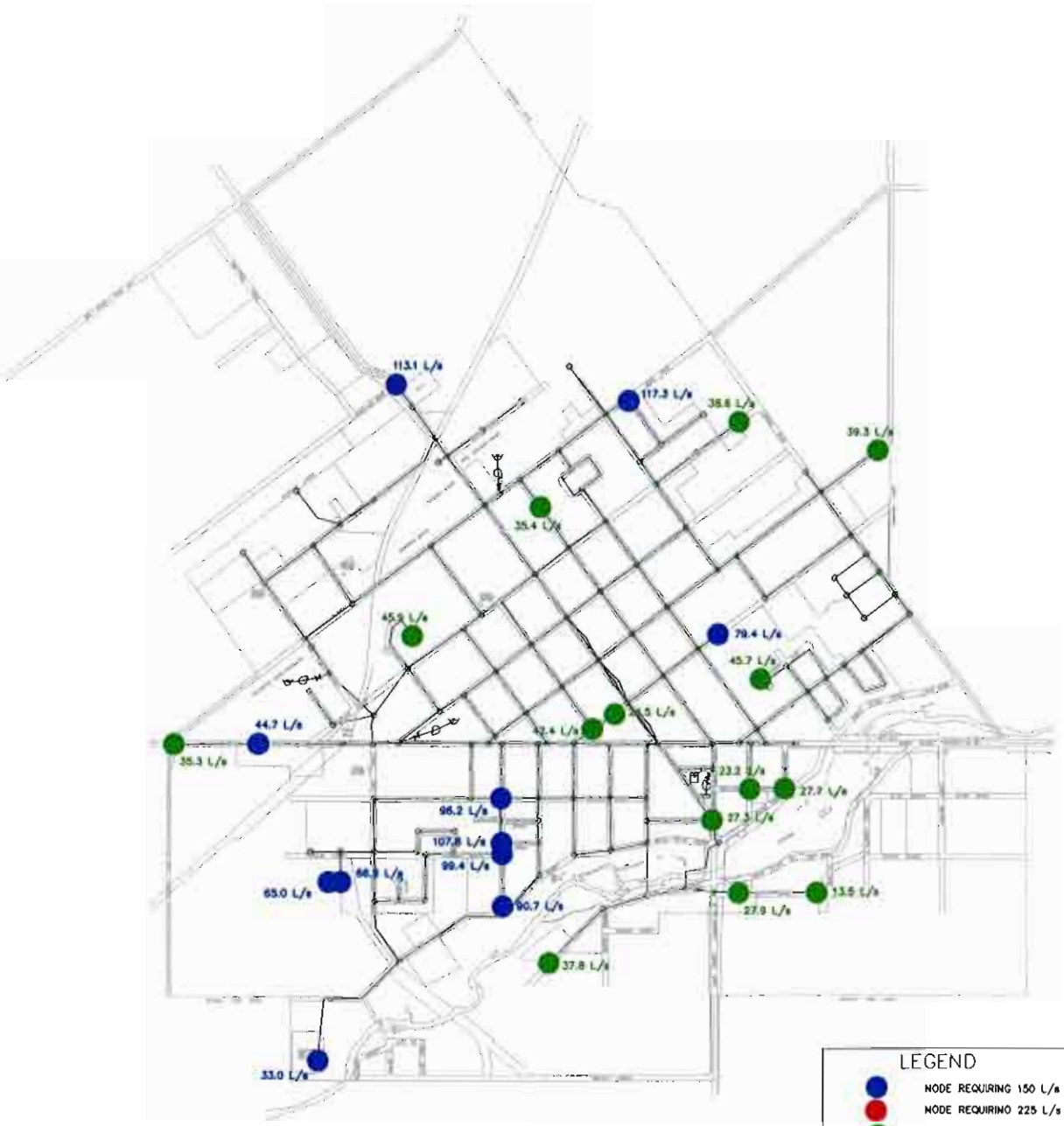
Mount Forest Master Plan

Fire Flows Applied to Water Distribution System (Existing Conditions - 2010)

CONTRACT No.	PROJECT No. 08158
SCALE N.T.S.	FIGURE No. 2.1



NOTE:
ABOVE SHOWN FIRE FLOWS (L/s) ARE BASED ON THAT REQUIRED TO MAINTAIN A MINIMUM SYSTEM PRESSURE OF 140 kPa AND BASED ON ESTIMATED STANDPIPE LIQUID LEVEL AT THE END OF 2 HOURS OF FIRE FLOW AT THE TARGET RATE APPLICABLE TO EACH MODEL JUNCTION LOCATION.

BMROSS engineering better communities	**Township of Wellington-North** **Mount Forest Master Plan** Locations Not Meeting Fire Flow Requirements (Existing Conditions - 2010)	CONTRACT No.	PROJECT No. 08158
		SCALE N.T.S.	FIGURE No. 2.2

- Several residential areas cannot maintain a target fire flow rate of 50 L/s, and this is generally due to small diameter watermain (i.e., 100 mm dia.), dead-end watermain, or a combination of both factors, in these areas. Problem areas in residential zones include:
    - Murphy Street, east of Main Street
    - South Water Street, from Bristol Street and to the east
    - York Street, from Peel street and to the east
    - Durham Street, at the eastern limit
    - Wellington Street, at the eastern limit
    - Queen Street, at the western limit
    - Silverbirch Street, at the watermain terminus
- Fire protection to the former arena (at King and Egremont Streets) can be sustained at approximately 80 L/s, well under the target ICI rate. The inadequate supply is largely attributed to the dead-end watermain on King Street to the arena.
- Fire protection to the Mount Forest Sports Complex can be sustained at approximately 65 L/s, well under the target ICI rate. The inadequate supply is largely attributed to the dead-end watermain at the at the Complex location, and the distance from the standpipe and booster pumping station.
- Fire protection to the Mount Forest Sewage Treatment Plant (STP) can be sustained at approximately 33 L/s, well under the target ICI rate. The inadequate supply is largely attributed to the dead-end watermain at the STP location, and the distance from the standpipe and booster pumping station.
- Fire protection to commercial areas near the western town limit (e.g., on Queen Street west of Durham Street) can be sustained at approximately 45 L/s. This is well under the target ICI rate. The inadequate supply is largely attributed to the dead-end watermain at this location, and the distance from the standpipe and booster pumping station.
- The target ICI rate was applied to residential transition areas on King Street, between Main and Elgin Streets. A fire flow of approximately 25-42 L/s can be sustained in this area, which is well under the target rate. The inadequate supply is largely attributed to the small diameter (i.e., 100 mm dia.) on King Street and the dead-end watermain on King Street.
- The target ICI rate was applied on Dublin and Arthur Streets, between Waterloo and North Water Streets. This area includes the Saugeen Valley Nursing Center and Louise Marshall Hospital. At some pressure junctions in this area, a fire flow of at least 150 L/s can be maintained for 2 hours. Along Dublin Street, the available fire flow would drop to approximately 91-108 L/s at the end of a 2 hour fire duration. This is attributed to the small diameter (i.e., 100 mm dia.) on Dublin Street.
- The target ICI rate was applied to the north end of Main Street and at several locations along Sligo Road. A fire flow of approximately 113 L/s can be sustained at the north end of Main Street, and approximately 117 L/s can be maintained at the eastern limit of Sligo Road. These flows represent approximately 75% of the target rate. At the north end of Main Street, the inadequate supply is attributed to dead-end watermain, and at the east end of Sligo Road the inadequate supply is primarily attributed to distance from the standpipe.

The above list is not exhaustive, as there were a limited number of junctions used to model the distribution system (i.e., many hydrant locations were not included in the model). Generally, hydrants serviced by 100 mm dia. watermain are considered to be inadequate for fire protection purposes and, therefore, all watermain that are intended to transmit fire flows and that are less than 150 mm dia. in size should be replaced.

It is recognized that the available fire flow rates will decline as the community grows, because there will be less surplus firm well supply capacity available and, therefore, less effective storage available for fire protection. This will further aggravate existing problem areas and also may result in available fire flows to certain areas dropping below target levels at some point in the future.

2.6. Possible Solutions for Water Supply Issues

Existing problems with the water distribution system are related to the inability, at certain locations, to provide adequate fire protection. Two primary factors contribute to these problems:

- inadequate watermain size, in particular, areas where 100 mm dia. watermain continues to be used
- lack of watermain looping (i.e., dead-end lines)

As noted, many of the current problems with available fire flow are due to watermain sizing. Current watermain design practice does not use watermain smaller than 150 mm dia. if fire flows are required. In many areas of Mount Forest existing 100 mm dia. watermain significantly limits fire flows. It is suggested that the Community of Mount Forest continue work to upgrade existing 100 mm dia. watermain. Depending on the location, 150 or 200 mm dia. would be required to resolve existing problems. Further analysis would be required to determine the size that would be most appropriate for each location.

Most areas where fire flows objectives are not being met are located on dead-end watermain. It is typically difficult to achieve fire flows on dead end mains. It may not be practical to achieve looping of watermain in some of these areas; establishing the feasibility of looping in specific areas will require further investigation.

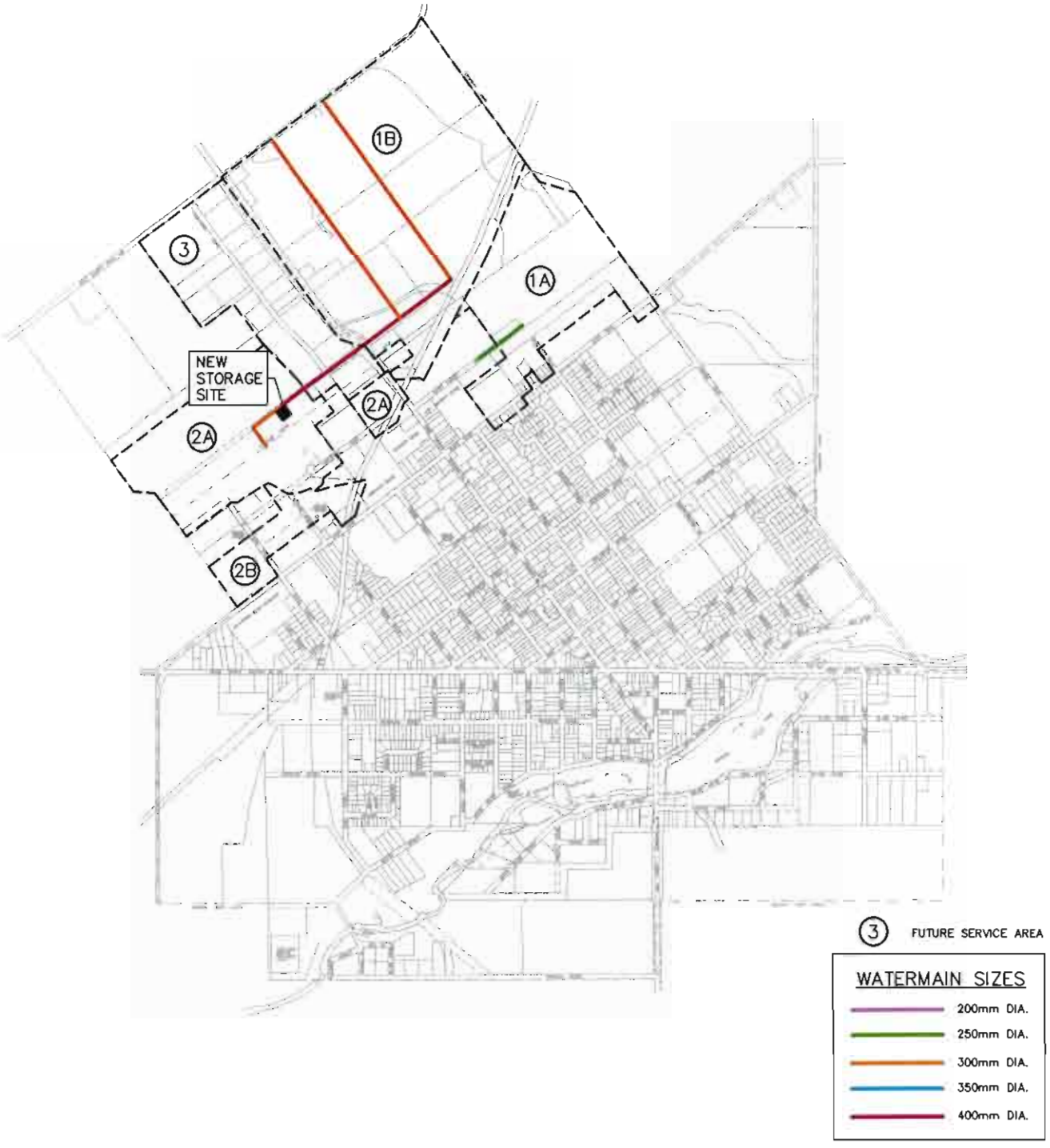
Residential areas where the target fire flow cannot be met, due to small diameter and/or poorly looped watermain, will likely be resolved through a longer term approach of replacing watermains or improving looping as part of road reconstruction projects. Minimum 150 mm dia. watermain should be used in residential areas if there is good looping. Minimum 200 mm dia. watermain should be used in residential areas where looping is not possible, and where looping is not expected to occur in the near future.

3. Future Servicing Requirements

3.1. Suggested Trunk Watermain Locations

Figures 3.1 to 3.5 show conceptual layouts for future trunk watermain and the proposed location of a new elevated water tank. Where appropriate, and as development occurs, these trunk watermains could be constructed on a staged basis. Actual locations and sizes for trunk watermain must be determined at the stage of detailed design for those works. Generally, the figures are similar to those presented in the 2003 Master Plan. Below is a list of work that has been constructed since the time of the 2003 Master Plan. This represents the majority of changes to Figures 3.1 to 3.5 since the 2003 Master Plan.

- A 300 mm dia. watermain on Main Street, from Industrial Drive to Coral Lea Drive and from Birmingham Street to Queen Street, has been constructed.
- A portion of the 300 mm dia. watermain on the Industrial Drive extension has been constructed.
- A 300 mm dia. watermain on Irwin Lytle Drive has been constructed.
- A 300 mm dia. watermain crossing of the Saugeen River has been constructed in a different location than shown in the 2003 Master Plan. The proposed route for connection of this watermain has been revised.
- A section of 250 mm dia. watermain at the east end of Birmingham Street has been constructed.
- A 300 mm dia. watermain on Cork Street, from Queen Street to Waterloo Street, has been constructed.
- A 250 mm dia. watermain on Durham Street, from East of Elgin Street to Main Street, has been constructed.
- 250 mm dia. watermain on Albert Street, from Oakview Crescent to the east and from London Road to the west, has been constructed.
- A 250 mm dia. watermain on Egremont Street, from Queen Street to Durham Street, has been constructed.



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Future Service Areas 1, 2, 3

CONTRACT No.	PROJECT No. 08158
SCALE N.T.S.	FIGURE No. 3.1

NOTES:

1. WATERMAIN SHOWN ASSUMING THAT BRISTOL STREET WATERMAIN WOULD BE INITIALLY CONSTRUCTED AS A "DEAD-END" WATER LINE TO SERVICE ONLY THE MURPHY PROPERTY, AND THEN THE HIGHWAY No.6 WATERMAIN WOULD BE CONSTRUCTED AT A LATER DATE. IF LOOPED INITIALLY, WATERMAIN SIZE COULD POTENTIALLY BE REDUCED.

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Mount Forest Master Plan

Future Service Areas 4 & 6 (Industrial Use)

CONTRACT No.	PROJECT No. 08158
SCALE N.T.S.	FIGURE No. 3.2

NOTE:

1. THE HATCHED PORTION OF FD AREA 5 IS THE APPROXIMATE AREA THAT WOULD NEED TO BE SERVICED BY A BOOSTER PUMPING STATION. (i.e. IT WOULD BE IN A SEPARATE PRESSURE ZONE)

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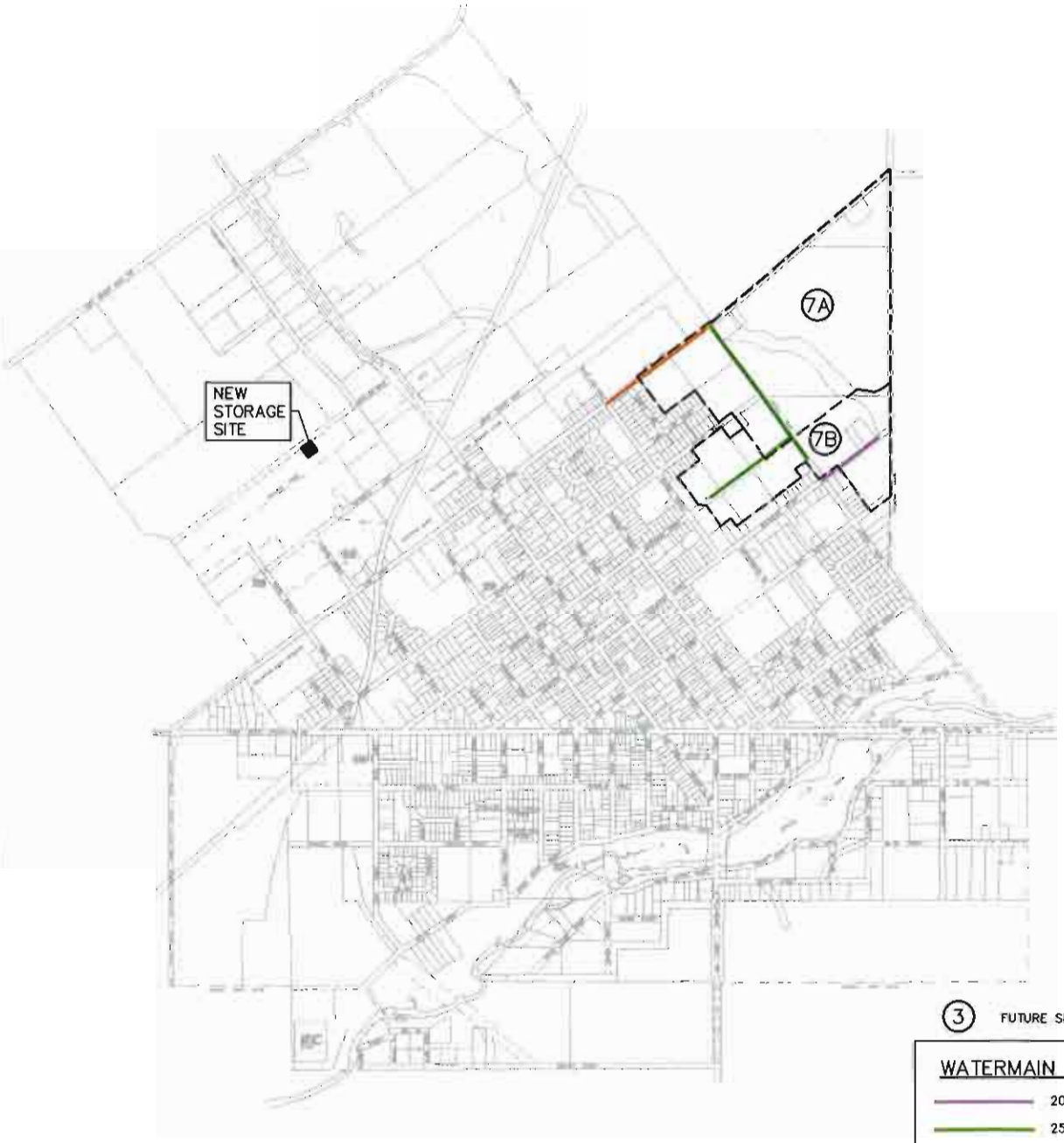
Township of Wellington-North

Mount Forest Master Plan

Future Service Areas 4, 5, 6 (Residential Use)

CONTRACT No.	PROJECT No. 08158
SCALE N.T.S.	FIGURE No. 3.3



NOTE:

1. WATERMAIN EAST OF LONDON ROAD MAY BE REDUCED IF THOSE AREAS ARE DEVELOPED AS RESIDENTIAL.

BMROSS engineering better communities	**Township of Wellington-North** **Mount Forest Master Plan** Future Service Area 7 (Industrial Area)	CONTRACT No.	PROJECT No. 08158
		SCALE N.T.S.	FIGURE No. 3.4

NOTE:

1. WATERMAIN IN RESIDENTIAL AREAS TO BE LOOPED 150mm DIA. WATERMAIN, OR LARGER "DEAD-END" WATERMAIN WILL BE REQUIRED.
2. WATERMAIN ON LOVER'S LANE MAY BE REDUCED TO 250mm DIA. IF AREAS SERVICED BY THAT MAIN ARE DEVELOPED AS RESIDENTIAL.
3. WATERMAIN ON CORK STREET MAY BE REDUCED IF AREAS SERVICED BY THAT MAIN ARE DEVELOPED AS RESIDENTIAL.

BMROSS engineering better communities	**Township of Wellington-North** **Mount Forest Master Plan** Future Service Areas 8 & 9 (Industrial Use) and Future Service Area 10 (Residential Use)	CONTRACT No.	PROJECT No. 08158
		SCALE N.T.S.	FIGURE No. 3.5

3.2. Model Assumptions

- Demands as per existing conditions model for the developed service area, plus 50 year serviced population for Future Service Areas (FSAs).
- **Will require new storage facility in northwest area of town.**
- New residential development average water demand = 3.70 m^3/ha/d (200 L/hhld/d) not including ICI demand. This demand, which is based on water usage records for the community, is generally much lower than would be expected for residential areas. Because fire flow conditions strongly govern the size requirements of watermain in the system, a higher residential water demand would not be expected to significantly impact the sizing of future watermain.
- New industrial development average water demand = 11.56 m^3/ha/d. This is based on weighted average of existing industrial demand. Weighted average was used because this calculation is consistent with the 2003 value used (11.53 m^3/ha/d) and likely provides a more realistic value than the directly calculated average (i.e., because several small users greatly reduced the average demand calculation, the directly calculated average may be unrealistically small for future use).
- New commercial development average water demand = 28 m^3/ha/d, in accordance with MOE Design Guidelines. The weighted average (105.67 m^3/ha/d) is believed to be unrealistically large due to one large customer with a small area footprint, while the average of usage rates (14.75 m^3/ha/d) is believed to be unrealistically low due to the many small customers.
- New institutional development is grouped with commercial development.
- Storage TWL = 461.40 mASL (as per existing standpipe).
- Assume the top 0.9 m of storage is used for well supply control.
- Assume the new storage facility will be 3,000 m^3 elevated tank, with a cross-sectional area of 283.5 m^2, or 283.5 m^3/m height of storage. (The actual tank geometry would include a conical shaped bottom, and the actual dimensions would need to be determined at the point of detailed design. Additionally, the actual water level elevations, methods of control, etc., would need to be determined at the point of detailed design.) The existing standpipe has 70.9 m^3/m height of storage. Combined storage volume is equivalent to 354.4 m^3/m height of storage.
- Based on future (50 year) maximum day demand of 74.0 L/s, the required equalization storage, in accordance with MOE Design Guidelines, is approximately 1,600 m^3.
- The bottom elevation of equalization storage is assumed to be 455.99 mASL, calculated as follows:
    - 1,600/354.4 = 4.51 m
    - 461.4 – 0.9 – 4.51 = 455.99 mASL
- The bottom elevation of residential fire storage is assumed to be 454.47 mASL, calculated as follows:
    - 50 L/s for 3 hours = 540 m^3
    - 540/354.4 = 1.52 m
    - 455.99 – 1.52 = 454.47 mASL

- The bottom elevation of ICI fire storage is assumed to be 451.42 mASL, calculated as follows:
  - 150 L/s for 3 hours = 1,620 m^3
  - 1,620/354.4 = 4.57 m
  - 455.99– 4.57 = 451.42 mASL
- The bottom elevation of downtown core fire storage is assumed to be 449.13, calculated as follows:
  - 225 L/s for 3 hours = 2,430 m3
  - 2,430/354.4 = 6.86 m
  - 455.99 – 6.86 = 449.13 mASL
- **Assume that all pumps, including the standpipe booster pump, are off for average day, peak day, and fire flow simulations.**

3.3. Average Day Demand (Ultimate Conditions)

- Most existing and future service areas will have pressures between 350 and 480 kPa (i.e., within MOE Design Guideline values).
- The following areas will have design pressures below 350 kPa:
  - The southeasterly portion of FSA 5 will have pressures at or below 275 kPa. This area will need to be serviced by a booster pumping station and thus placed in a new pressure zone, separate from the existing distribution system.
  - The area near the standpipe, and to the east/northeast along Albert Street as far as London Road, may have pressures as low as 300 kPa.

3.4. Peak Day Demand (Ultimate Conditions)

- Most existing and future service areas will have pressures between 350 and 480 kPa (i.e., within MOE Design Guideline values).
- Some existing and future service areas will have pressures below 300 kPa. These areas include:
  - The southeasterly portion of FSA 5 will have pressures at or below 260 kPa. As discussed above, this area will need to be serviced by a booster pumping station.
  - The area near the standpipe, and to the east/northeast along Albert Street as far as London Road, may have pressures as low as 290 kPa.

3.5. Maximum Day Plus Fire Flow Future Service Area Requirements

Future Service Areas 1, 2, & 3

FSA Areas 1B & 3

- A new storage facility will be required to provide adequate fire protection to these industrial lands (see attached drawings 3.1 to 3.5 for proposed storage site).
- Servicing of the industrial lands will likely occur in stages, and the following trunk watermain sizes are required:

  - 400 mm dia., from the new storage facility and to the east along Coral Lea Drive and in to the Egremont Annexation lands.
  - 300 mm dia. dead-end trunk feeder lines within the future industrial lands
- Where possible, looped watermain sections should be constructed.

FSA Areas 1A & 2

- A new 300 mm dia. watermain has been constructed from Industrial Drive (east of Victoria Street) to, approximately, the Township limits. This 300 mm dia. watermain should be extended to the new storage facility, providing a looped watermain in that area.
- Extend the 250 mm dia. watermain on Mount Forest Drive and connect to the 300 mm dia. watermain on Irwin Lytle Drive.

Future Service Areas 4 & 6

Commercial Land Use

- A second connection, from the existing standpipe to south of the Saugeen River, will be required in order to provide adequate fire flow to the commerical lands south of the River. The Township has constructed a 300 mm dia. watermain crossing the River, generally from the north end of Bristol Street to the south end of James Street. Design has been completed for extending this 300 mm dia. watermain to the existing standpipe.
- In order to service FSAs 4A and 4B with a dead-end watermain along South Water and Bristol Streets, the watermain would need to be a minimum 350 mm dia.
- Assuming the above construction occurs, watermain along Main Street, south of South Water and Murphy Streets, would then be 300 mm dia., provided that 300 mm dia. watermain was also constructed on Bentley Street to complete a loop.
- As an alternative to constructing watermain on South Water, Bristol, Main, and Bentley Streets in stages (including the 350 mm main), 300 mm dia. would be sufficient if a looped trunk watermain was all constructed initially.
- Because sizes required for the watermain construction in the areas listed above will depend on the sequence of construction in each FSA, the actual sizes to be used should be determined at the detailed design stage.

Residential Land Use

- Minimum 250 mm dia. watermain, connected to the existing 250 mm dia. River crossing, should be used in all dead-end areas.
- Note that the watermain diameters, suggested in Commercial Land Use section above, could be reduced significantly if only low to medium density residential development were to occur in these FSAs.

Future Service Area 5

- The ground surface elevation in FSA 5 is up to 437 mASL, which is approximately 8 m higher than the ground elevation at the existing standpipe. As discussed in Sections 3.3 and 3.4, system pressures will be low at average or peak day conditions.
- In order to provide adequate service to the southeasterly part of FSA 5, this area will need to be serviced by a booster pumping station and thus placed in a new pressure zone, separate from the existing distribution system. The approximate limit of such a separate pressure zone is depicted on Figure 3.3.
- The lower elevation areas could be included in the existing pressure zone and serviced with minimum 250 mm dia. dead-end watermain.

Future Service Areas 7

- The existing 300 mm dia. watermain on Sligo Road should be extended to London Road.
- A dead-end 250 mm dia. watermain was recently constructed on Birmingham Street, from the intersection with Church Street and to the northeast. A long-term plan should include the extension of this watermain to London Road when development occurs along Birmingham Street and/or along undeveloped areas along London Road.
- Residential development along London Road should include the construction of minimum 150 mm dia. watermain, assuming that the watermain will be looped.

Future Service Areas 8, 9, & 10

- Minimum 250 mm dia. watermain should be constructed on Queen Street and Sligo Road in order to establish a 250 mm dia. loop.
- A 300 mm dia. watermain is currently planned for construction on Cork Street, from Queen to Waterloo Street. Future road reconstruction on Cork Street should include extension of this 300 mm dia. watermain to Martin Street.
- Watermain size to be constructed on Lover's Lane will depend on land use. Residential development will require minimum 250 mm dia. dead-end watermain. Industrial or commercial development will require minimum 350 mm dia. dead-end watermain.

Notes prepared by Andrew Garland, BMROSS

APPENDIX C
WATER STORAGE REQUIREMENTS AND WATER WORKS COST ESTIMATES

TOWNSHIP OF WELLINGTON NORTH
MOUNT FOREST WATER WORKS MASTER PLAN
WATER STORAGE REQUIREMENTS

CURRENT WATER STORAGE REQUIREMENT

Assumptions

- Design for current service conditions based on 2006 population data
- 2006 population = 4,750
- Max day demand based on 2007 Max. Day of 3,469 m^3/d

Storage Volume (as per MOE Design Guidelines)

Storage = A + B + C

Where A = fire storage component
B = equalization storage component
C = emergency storage component

Fire Storage (A) – See Appendix N of MOE Design Guidelines

A = 125 L/s + (144-125) x (4,750 – 4,000)/(5,000 - 4,000) for 2 hrs
= (125 + 14.3) L/s x 2 hrs x 3,600 s/hr x 10^{-3} m^3/L
= **1003 m^3**

Equalization Storage (B)

B = 25% of maximum day demand
= 0.25 x 3,469
= **867 m^3**

Emergency Storage (C)

C = 0.25 x (A + B)
= 0.25 x (1003 + 867)
= **467 m^3**

Total Storage (A+B+C)

Design storage required = 1003 + 867 + 467
= 2,337 m^3 of "effective" storage
say **2,400 m^3**

NOTE: The existing standpipe on Parkside Drive has an approximate rated storage capacity of 2083 m^3 (as per Certificate of Approval). Roughly, in the order of 1,000 m^3 of this storage is "effective" storage, based on the limited height and type of this water works facility. A booster pumping station increases the "effective" storage to approximately 2,000 m^3.

50 YEAR WATER STORAGE REQUIREMENT

Assumptions

- Design for 50 year (Yr. 2061) service conditions
- 2061 population = 10,650
- Assume industrial growth will be at the same rate as population growth
- 316 Lpcd average day demand (all users)
- Max day demand factor of 1.9
- Firm water supply capacity available in 50 years assumed will be equal to the 50 year maximum day demand

NOTE: Current firm capacity is approximately 62.4 L/s (i.e., with Well 5 out of service for any reason), which is less than the calculated design 50 year max day demand. Therefore, additional firm supply capacity will be required prior to 2061.

Storage Volume (as per MOE Design Guidelines)

Fire Storage (A) – See Appendix N of MOE Design Guidelines

A = 189 L/s + (220-189) x (10,650 – 10000)/(13000 – 10000) for 3 hrs
= (189 + 6.717) L/s x 3 hrs x 3,600 s/hr x 10^{-3} m^3/L
= **2,114 m^3**

Equalization Storage (B)

B = 25% of maximum day demand

Max day demand = 10,650 capita x 316 Lpcd x 10^{-3} m^3/L x 1.9
= 6,394 m^3/d (equivalent to 74.0 L/s)

B = 0.25 x 6,394= **1,599 m^3**

Emergency Storage (C)

C = 0.25 x (A + B)
= 0.25 x (2,114 + 1,599)
= **928 m^3**

Total Storage (A+B+C)

Design storage required = 2,114 + 1,599 + 928
= 4,641 m^3 of "effective" storage
say **5,000 m^3**

References

MOE, "Guidelines For The Design of Water Distribution Systems", July 1985

TOWNSHIP OF WELLINGTON NORTH
MOUNT FOREST WATER WORKS
Elgin Street, Wellington Street to King Street

Watermain

Item	Quantity	Unit	Unit Price	Amount
250mm dia. P.V.C. DR18	190	m	$200.00	$38,000.00
250mm Gate Valve	2	ea.	$2,000.00	$4,000.00
250x250x250mm Tee	2	ea.	$600.00	$1,200.00
Connection to Existing	2	ea.	$1,800.00	$3,600.00
Subtotal				$46,800.00

Road Restoration

Item	Quantity	Unit	Unit Price	Amount
Granular 'A'	360	t	$13.50	$4,860.00
Granular 'B'	1040	t	$10.00	$10,400.00
HL4	130	t	$115.00	$14,950.00
HL3	110	t	$120.00	$13,200.00
Subtotal				$43,410.00

Summary

Road Works	$43,410.00
Watermain	$46,800.00
Subtotal	$90,210.00
Contingency (10%)	$9,021.00
Subtotal	$99,231.00
Engineering (15%)	$14,884.65
Subtotal	$114,115.65
HST (13%)	$14,835.03
MOE application fee	$1,200.00
Total	$130,150.68
say	**$130,000.00**

Assumptions

APPENDIX D
SEWAGE FLOW CALCULATIONS

Population Density

Commercial	54 Persons/ha
Industrial	7 Persons/ha
Residential	34 Persons/ha

Average Fow Per Capita = 300 L/day
0.3 m3/day

2031

SPS	FSA	Land Use	2030 Areas (ha)	Residential Population	Equivalent Population
Durham St.	1A	Industrial	21.5		151
		Residential	4.4	150	150
	1B	Industrial	0		0
		Commercial	6.1		329
	2A	Industrial	6.1		43
	3	Commercial	0		0
	7A	Residential	2.6	88	88
		Totals	40.7	238	761

Peaking Factor (M) =	3.87	
Existing Peak Flow =	42.20	(L/s)
Future Peak Flow =	18.78	(L/s)
Total Peak for 2030 =	60.98	(L/s)

Cork St.	2B	Industrial	0		0
	8	Sports Complex	2.4		N/A
		Commercial	3.3		178
		Residential	0	0	0
	9	Industrial	0		0
	10	Nursing Care Centre	3.9		N/A
		Residential	6.6	224	224
		Totals	16.2	565	403

Peaking Factor (M) =	4.02	
Existing Peak Flow =	35.70	(L/s)
Future Peak Flow =	9.02	(L/s)
Total Peak for 2030 =	44.72	(L/s)

S. Water St.	4A	Residential	13	442	442
		Commercial	3.6		194
	6A	Commercial	3.2		173
		Residential	0	0	0
	4B	Residential	0	0	0
		Commercial	0		0
	5	Residential	0.4	14	14
	6B	Residential	0	0	0
		Commercial	0		0
		Totals	20.2	456	823

Peaking Factor (M) =	3.85	
Existing Peak Flow =	0.00	(L/s)
Future Peak Flow =	15.25	(L/s)
Total Peak for 2030	15.25	(L/s)

N. Water St.	7B	Residential	9.1	309	309
		Totals	9.1	309	309

Peaking Factor (M) =	4.07	
Existing Peak Flow =	86.10	(L/s)
Future Peak Flow =	6.29	(L/s)
Peak for 2030	92.39	(L/s)
Durhan St Peak Flow =	60.98	(L/s)
Cork St. Peak Flow =	44.72	(L/s)
S. Water Peak Flow =	15.25	(L/s)
Total Peak Flow to N. Water Street for 2030 =	213.34	(L/s)

2061

SPS	FSA	Land Use	2061 Areas (ha)	Residenial Population	Equivalent Population
Durham St.	1A	Industrial	27.6		193
		Residential	4.4	150	150
	1B	Industrial	70.6		494
		Commercial	6.1		329
	2A	Industrial	9.3		65
	3	Commercial	0		0
	7A	Residential	14.9	507	507
		Totals	132.9	656	1738

Peaking Factor (M) =	3.63	
Existing Peak Flow =	42.20	(L/s)
Future Peak Flow =	49.83	(L/s)
Total Peak for 2060	92.03	(L/s)

Cork St.	2B	Industrial	6.1		43
	8	Sports Complex	2.4		N/A
		Commercial	3.3		178
		Residential	12.9	439	439
	9	Industrial	0		0
	10	Nursing Care Centre	3.9		N/A
		Residential	6.6	224	224
		Totals	35.2	965	884

Peaking Factor (M) =	3.83	
Existing Peak Flow =	35.70	(L/s)
Future Peak Flow =	19.16	(L/s)
Total Peak for 2060	54.86	(L/s)

S. Water St.	4A	Residential	26.5	901	901
		Commercial	3.6		194
	6A	Commercial	3.2		173
		Residential	4.3	146	146
	5	Residential	18.9	643	643
	4B	Residential	0	0	0
		Commercial	0		0
	6B	Residential	3.6	122	122
		Commercial	3.6		194
		Totals	63.7	1812	2374

Peaking Factor (M) =	3.53	
Existing Peak Flow =	0.00	(L/s)
Future Peak Flow =	42.45	(L/s)
Total Peak for 2058	42.45	(L/s)

N. Water Street	7B	Residential	18.9	643	643
		Totals	18.9	643	643

Peaking Factor (M) =	3.92	
Existing Peak Flow =	86.10	(L/s)
Future Peak Flow =	12.71	(L/s)
Peak for 2060	98.81	(L/s)

Durham St Peak Flow =	92.03	(L/s)
Cork St. Peak Flow =	54.86	(L/s)
S. Water Peak Flow =	42.45	(L/s)
Total Peak Flow to N. Water Street for 2060 =	288.14	(L/s)

Summary:

SPS	Peak Flow (L/s)	
	2031	2061
Durham St.	61.0	92.0
Cork St.	44.7	54.9
South Water St.	15.2	42.4
North Water St.	213.3	288.1

Notes:

1. Service areas (ha) are taken from Chapter 3 of the 2010 Mt. Forest Master Plan Update
2. Existing peak flows are taken from BMROSS 08079 Mt. Forest SPS Class EA
3. Equivalent population for industrial and commercial/institutional areas are calculated for the purpose of establishing peaking factors and peak flows.
4. Equivalent population for industrial areas is estimated at 7 people/ha. This is based on estimated flows of 2.0 m3/ha/d for industry, and 300 L/c/d per capita for residential.
5. Equivalent population for commercial areas is estimated at 54 people/ha.
6. Where areas contain both commercial and residential development, it is assumed that 50% of the area will be used for each.

APPENDIX E
SANITARY FACILITY UPGRADES – OPINION OF PROBABLE COSTS

TOWNSHIP OF WELLINGTON NORTH
MOUNT FOREST SANITARY SEWERS
Birmingham Street - London Road to Existing (east of Church Street)

Sanitary Sewer

Item	Quantity	Unit	Unit Price	Amount
300mm dia. PVC SDR35	375	m	$250.00	$93,750.00
1200mm dia. manhole	4	ea.	$5,000.00	$20,000.00
Subtotal				$113,750.00

Road Construction

Item	Quantity	Unit	Unit Price	Amount
Granular 'A'	1420	t	$13.00	$18,460.00
Granular 'B'	4100	t	$10.00	$41,000.00
HL4	430	t	$120.00	$51,600.00
HL3	350	t	$130.00	$45,500.00
Subtotal				$156,560.00

Summary

Road Works	$156,560.00
Sanitary Sewer	$113,750.00
Subtotal	$270,310.00
Contingency (10%)	$27,031.00
Subtotal	$297,341.00
Engineering (15%)	$44,601.15
Subtotal	$341,942.15
HST (13%)	$44,452.48
MOE application fee	$1,100.00
Total	$387,494.63
say	**$390,000.00**

Assumptions

APPENDIX F
PUBLIC CONSULTATION – NOTICES, REVIEW AGENCY LIST, MEETING NOTES

File: 08158

TOWNSHIP OF WELLINGTON NORTH

CLASS ENVIRONMENTAL ASSESSMENT
SERVICING MASTER PLAN UPDATE
COMMUNITY OF MOUNT FOREST

PUBLIC OPEN HOUSE
November 24, 2010

COMMENTS

Name: _____

Address: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

PLEASE HAND IN, MAIL, EMAIL OR FAX TO:

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Phone: (519) 524-2641 Fax: (519) 524-4403
E-mail: kvader@bmross.net
Attention: Kelly Vader, Environmental Planner

Comments and Information collected by B.M. Ross & Associates Limited on behalf of the Township of Wellington North will assist in decision making pertaining to the Master Plan study. Comments and opinions will be kept on file but will not be included in study documentation made available for public review. Under the Freedom of Information and Protection Act (1987) personal information provided to the Township will remain confidential unless prior consent is obtained.

TOWNSHIP OF WELLINGTON NORTH

WATER AND SEWAGE MASTER PLAN UPDATE
COMMUNITY OF MOUNT FOREST

INFORMATION SESSION FOR RESIDENTS

November 24, 2010

WELCOME

Township of Wellington North

BMROSS engineering better communities

BACKGROUND

2003:

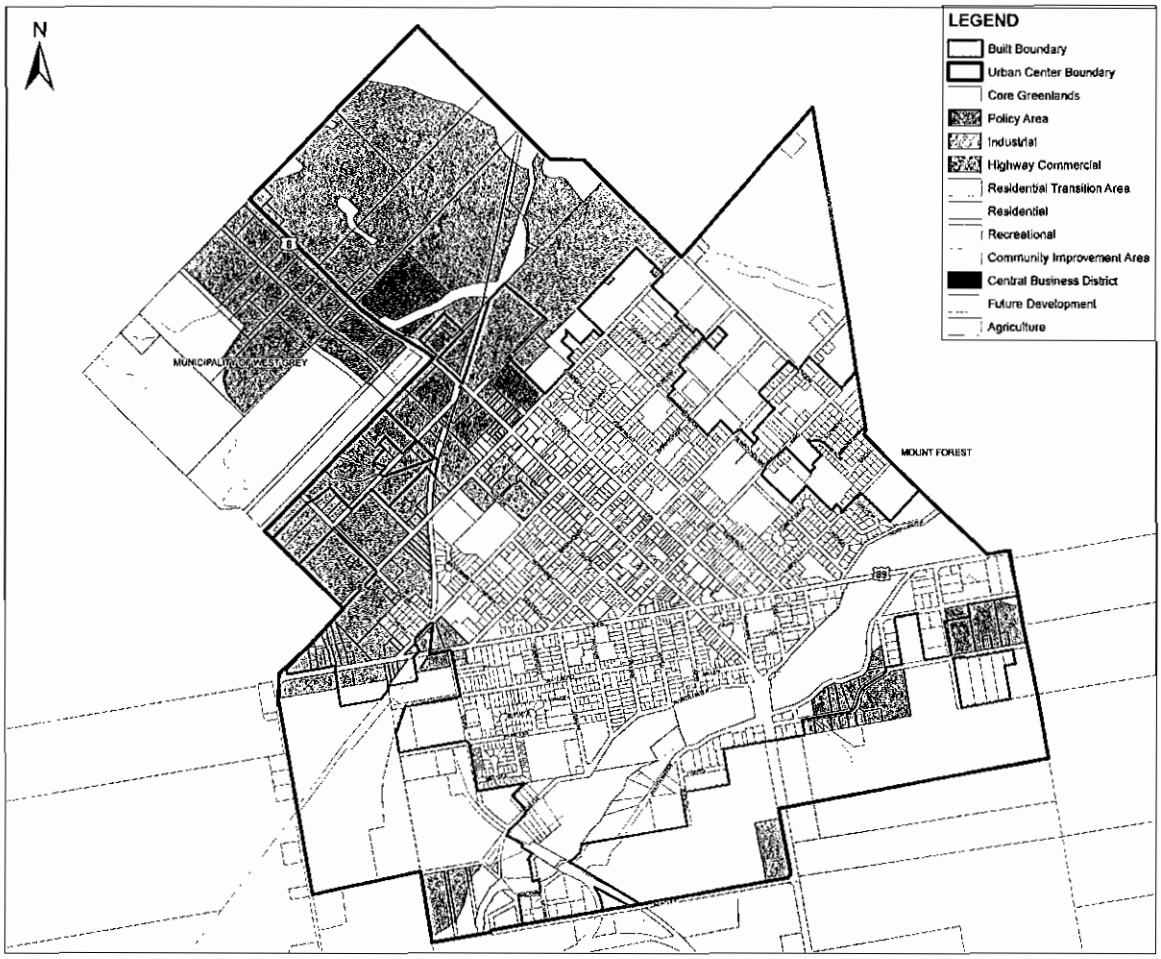
- WATER SUPPLY AND SANITARY SEWAGE COLLECTION MASTER PLAN COMPLETED FOR THE COMMUNITY OF MOUNT FOREST

2008:

- POPULATION, HOUSING AND EMPLOYMENT FORECAST UPDATE PREPARED BY C.N. WATSON & ASSOCIATES . REPORT SUBSEQUENTLY ADOPTED BY THE TOWNSHIP FOR INFRASTRUCTURE PLANNING PURPOSES

2009:

- TOWNSHIP OF WELLINGTON NORTH COMPREHENSIVE REVIEW OF RESIDENTIAL AND EMPLOYMENT GROWTH REPORT PREPARED BY COUNTY OF WELLINGTON



Mount Forest OP Designations

Township of Wellington North

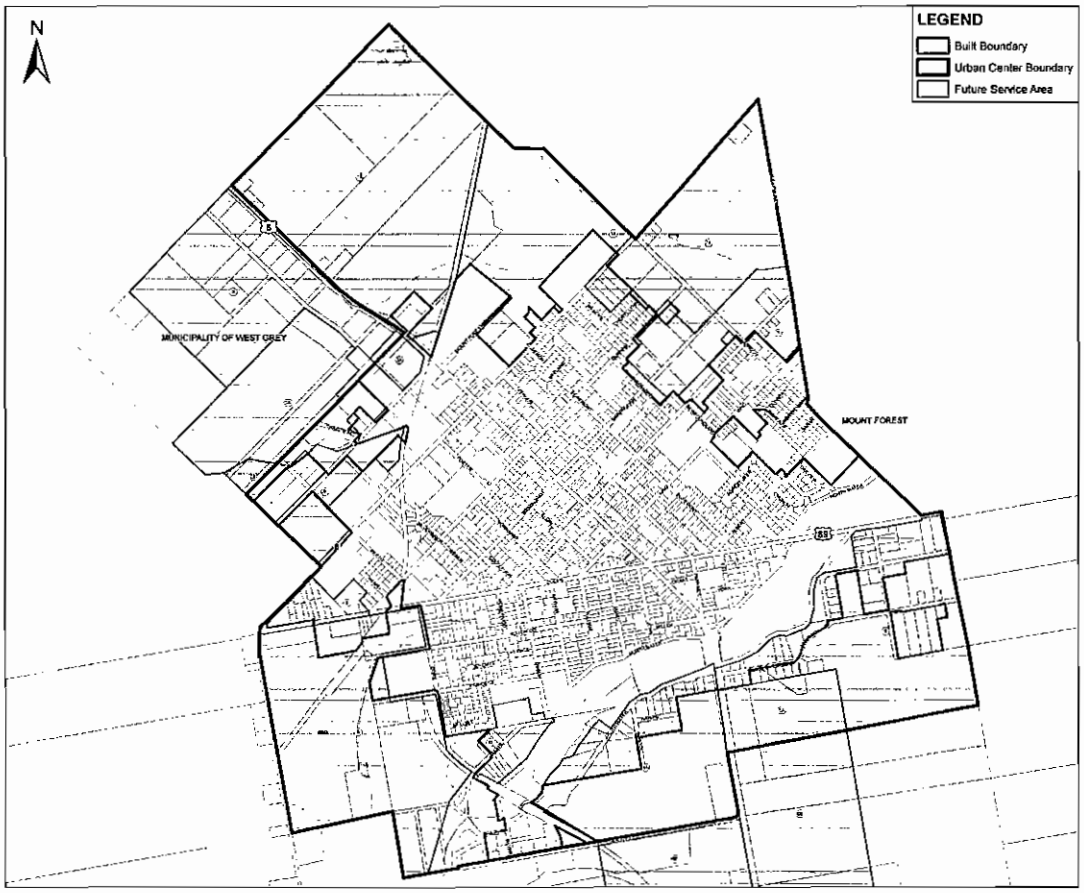
BMROSS engineering better communities

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT (CLASS EA)

MASTER PLANS:

- LONG RANGE PLANS DESIGNED TO INTEGRATE INFRASTRUCTURE REQUIREMENTS FOR EXISTING AND FUTURE LAND USES WITH ENVIRONMENTAL ASSESSMENT PLANNING PRINCIPLES
- INCORPORATE AT A MINIMUM, PHASES 1 & 2 OF THE ENVIRONMENTAL ASSESSMENT PROCESS
- RECOMMENDS AN INFRASTRUCTURE MASTER PLAN THAT CAN BE IMPLEMENTED THROUGH THE COMPLETION OF INDIVIDUAL PROJECTS

FUTURE SERVICE AREAS:



Township of Wellington North

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MASTER PLAN PROCESS

BACKGROUND REVIEW

EVALUATE PROBLEMS AND IDENTIFY ALTERNATIVE SOLUTIONS

IDENTIFY IMPACT OF ALTERNATIVE SOLUTIONS ON THE ENVIRONMENT, AND MITIGATING MEASURES

← PRESENT

EVALUATE ALTERNATIVE SOLUTIONS: IDENTIFY RECOMMENDED SOLUTIONS

CONSULT WITH THE PUBLIC AND REVIEW AGENCIES TO IDENTIFY ANY ISSUES OR CONCERNS WITH DEFINED PROBLEMS AND ALTERNATIVE SOLUTIONS

ASSESS POTENTIAL NEGATIVE AFFECTS: DEVELOP MITIGATION AND IMPACT MANAGEMENT

SELECT PREFERRED LONG-TERM SERVICING PLAN

PREPARE MASTER PLAN TO DOCUMENT STUDY FINDINGS

SUBMIT MASTER PLAN TO COUNCIL FOR REVIEW AND APPROVAL

PUBLISH NOTICE OF COMPLETION OF MASTER PLAN
CIRCULATE THE DOCUMENT TO INTERESTED STAKEHOLDERS
IDENTIFY CLASS EA STUDIES NEEDED TO IMPLEMENT THE MASTER PLAN

Township of Wellington North

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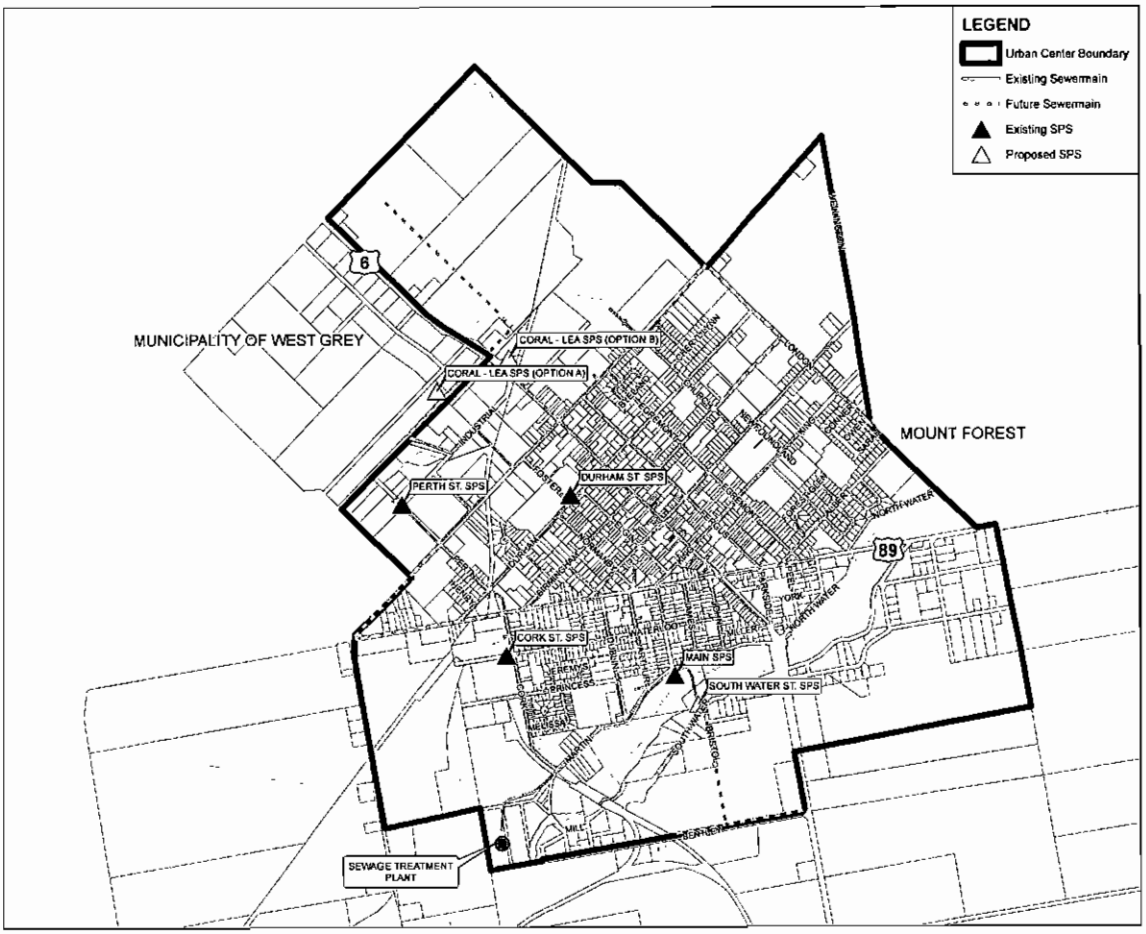
SANITARY COLLECTION SYSTEM



PRIORITY PROJECTS:

- CONSTRUCT SOUTH WATER STREET SPS
  - SERVICE MURPHY LANDS
- CONSTRUCT CORAL-LEA DRIVE SPS
  - SERVICE INDUSTRIAL LANDS IN NORTHEAST
- EXTEND SANITARY COLLECTION MAINS
  - SERVICE LONDON ROAD CORRIDOR, MURPHY LANDS, INDUSTRIAL AREAS IN NORTHEAST AND NORTHWEST

Township of Wellington North

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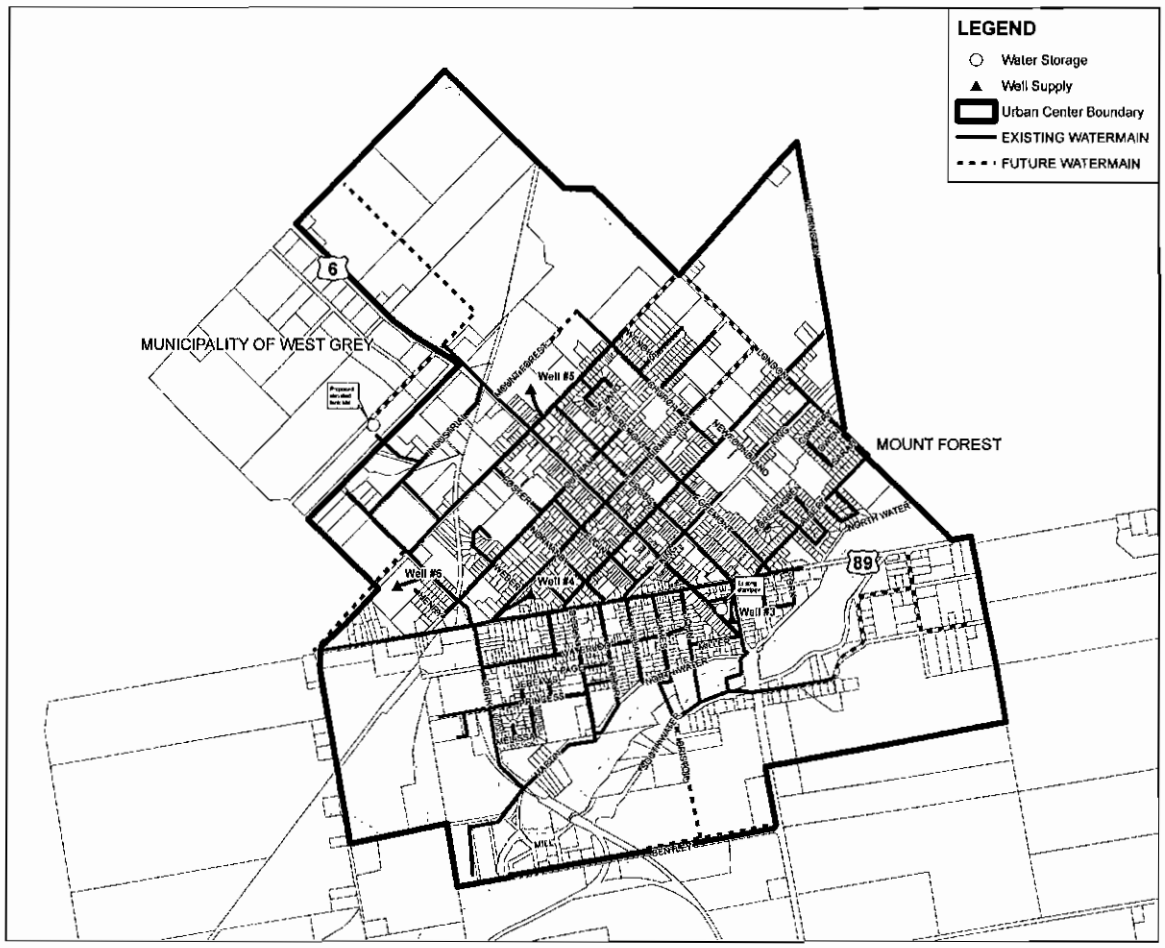
WATER SUPPLY



PRIORITY PROJECTS:

- EXAMINE PERFORMANCE OF EXISTING WELLS
  - IMPROVE PUMPING CAPACITY
- CONSTRUCT ELEVATED TANK NEAR CORAL-LEA DRIVE
  - INCREASE WATER STORAGE CAPACITY
  - IMPROVE SYSTEM PRESSURE AND FIRE FLOWS
- EXTEND WATERMAINS
  - SERVICE LONDON ROAD CORRIDOR, MURPHY LANDS, INDUSTRIAL AREAS IN NORTHEAST AND NORTHWEST

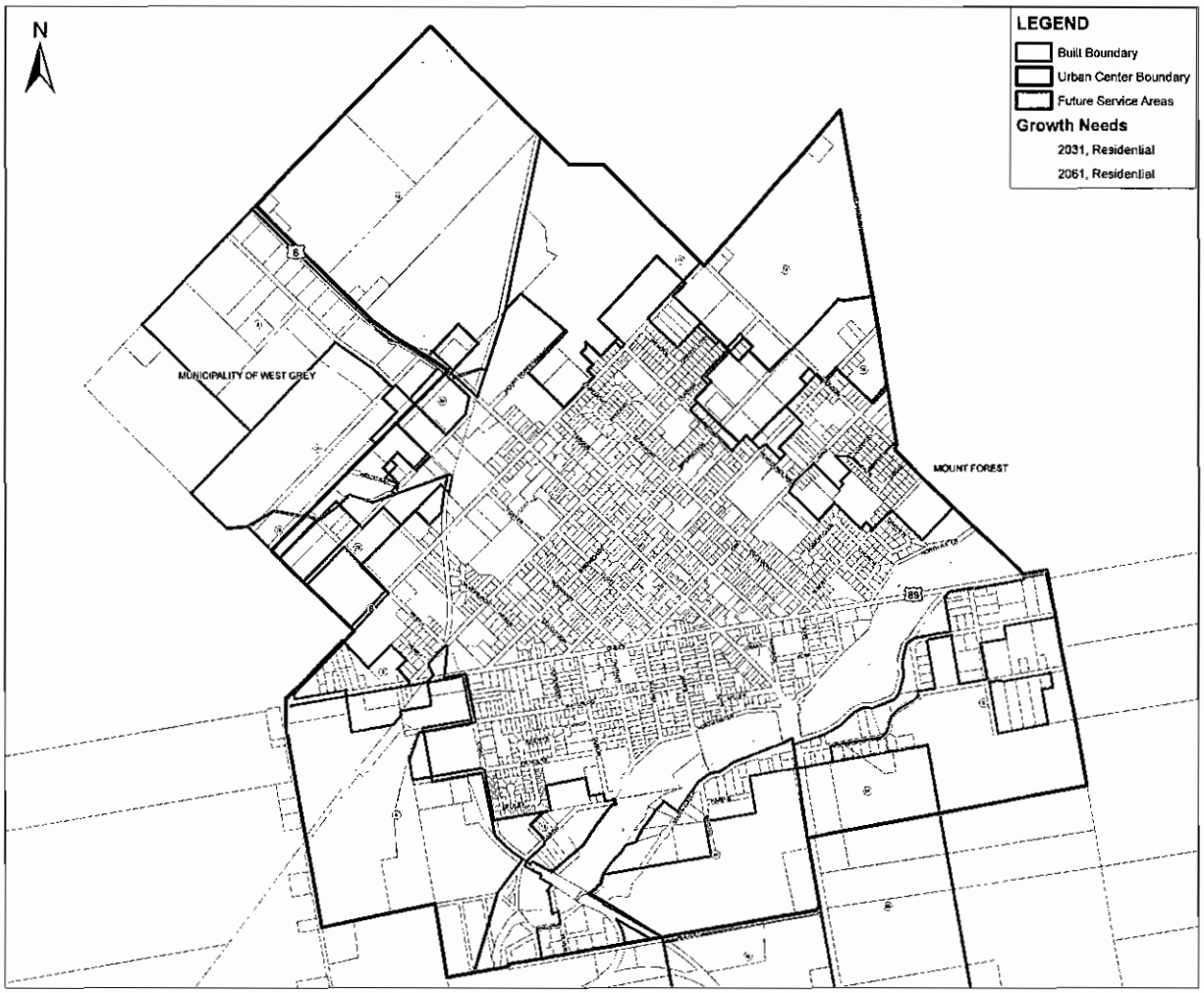
Township of Wellington North

BMROSS engineering better communities

RESIDENTIAL GROWTH PROJECTIONS

POPULATION AND GROWTH:

- TWENTY YEAR GROWTH TO 2031
  - PROJECTED POPULATION INCREASE OF 2,560
  - ANTICIPATED HOUSEHOLD INCREASE OF 980
- FIFTY YEAR GROWTH FROM 2031 TO 2061
  - PROJECTED POPULATION INCREASE OF 3,030
  - ANTICIPATED HOUSEHOLD INCREASE OF 1,220



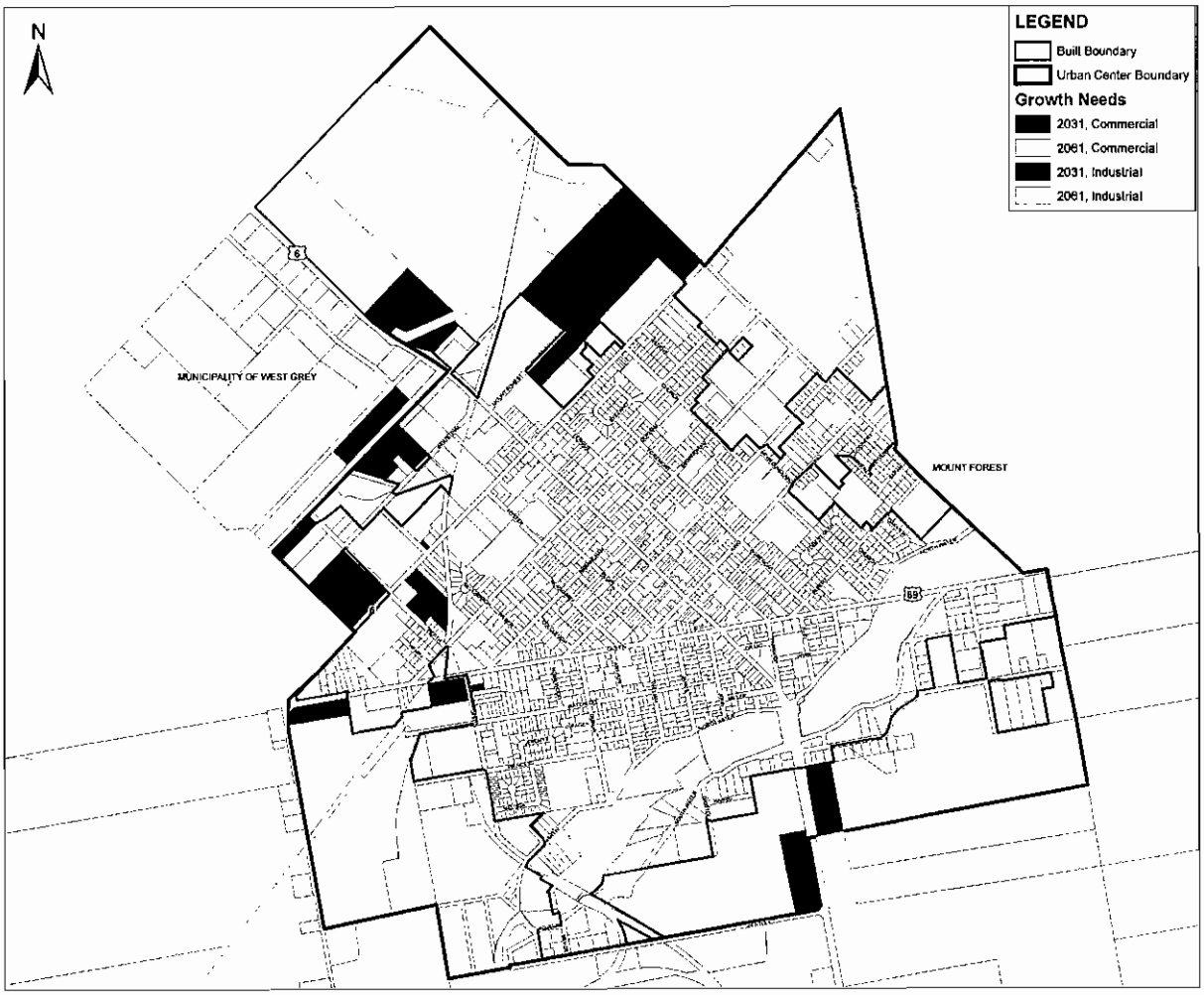
Township of Wellington North

BMROSS engineering better communities

EMPLOYMENT LANDS GROWTH PROJECTIONS

POPULATION AND GROWTH:

- TWENTY YEAR EMPLOYMENT GROWTH TO 2031
  - ANTICIPATED COMMERCIAL GROWTH OF 220 JOBS AND 6.6 HA OF LAND
  - INDUSTRIAL GROWTH PROJECTED AT 377 JOBS AND 16 HA OF LAND
- FIFTY YEAR EMPLOYMENT GROWTH – FROM 2031 TO 2061
  - COMMERCIAL GROWTH PROJECTED AT 330 JOBS AND 9.9 HA OF LAND
  - ANTICIPATED HOUSEHOLD INCREASE OF 565 JOBS AND 24.1 HA OF LAND



Township of Wellington North

BMROSS engineering better communities

TOWNSHIP OF WELLINGTON NORTH
MOUNT FOREST SERVICING MASTER PLAN UPDATE

PROJECT SUMMARY

BACKGROUND AND PURPOSE

In 2003, the Township of Wellington North completed a water supply and sanitary sewage collection Master Plan for the community of Mount Forest. The study was initiated in June of 2003 and followed the guidelines set out for Master Plans in the Municipal Class Environmental Assessment (Class EA) document, dated June 2000. The study was initiated following the annexation of a portion of the (former) Township of Egremont located on Mount Forest's northeastern border. In light of the increased land base and the need to service the new lands to permit future development, the Township decided to initiate a Master Plan process to evaluate options for providing water supply and sanitary sewage collection services to future development lands. The study concluded in December 2003 with the preparation of a Master Plan document.

An update to the Servicing Master Plan is being undertaken at this time to incorporate the results of recent planning reports completed by the County of Wellington and to incorporate servicing initiatives implemented by the Township since completion of the 2003 Master Plan.

CURRENT INVESTIGATIONS

The Servicing Master Plan update process will involve a review of existing water supply and sanitary sewage collection components and any changes which have been implemented since completion of the 2003 Master Plan. Identification of future infrastructure needs required to service new development initiatives (Murphy Lands), as well as potential impacts to existing infrastructure, will also be assessed. A range of servicing options will be identified to address immediate and long-term needs (i.e., 20-year and 50-year planning periods). All feasible alternatives will be evaluated, taking into consideration factors such as cost, complexity, environmental risk, development needs and the implications for current and future land use. Comments provided by the public and government review agencies will also be considered as part of the evaluation of alternatives.

STUDY RECOMMENDATIONS

Upon completion, the Master Plan update will establish a plan to integrate future development areas into an expanded municipal service area. The study will also identify strategies to coordinate the construction of watermains and sanitary sewage collection facilities with other municipal infrastructure improvement projects. Findings will be incorporated into an updated Master Plan document. The study recommendations will provide the Township with a basis on which to make future decisions on the development and expansion of water supply and sanitary sewage collection facilities.

Wellington North

TOWNSHIP OF WELLINGTON NORTH

MOUNT FOREST SERVICING MASTER PLAN UPDATE
NOTICE OF PUBLIC OPEN HOUSE

PUBLIC COMMENT INVITED

THE PROJECT:

In 2003 the Township of Wellington North completed a water supply and sanitary sewage collection Master Plan for the community of Mount Forest which identified a framework for the provision of future water supply and sanitary sewage collection facilities within the community. An update to the Servicing Master Plan is being undertaken at this time to incorporate the results of recent planning reports completed by the County of Wellington and to incorporate servicing initiatives implemented by the Township since completion of the Master Plan.

The Servicing Master Plan update process will involve a review of existing water supply and sanitary sewage collection components and any changes which have been implemented since completion of the Master Plan. Identification of future infrastructure needs required to service new development initiatives (Murphy Lands), as well as potential impacts to existing infrastructure, will also be assessed. Upon completion, the Master Plan update will establish a plan to integrate future development areas into an expanded municipal service area. The study will also identify strategies to coordinate the construction of watermains and sanitary sewage collection facilities with other municipal infrastructure improvement projects.

THE ENVIRONMENTAL ASSESSMENT PROCESS:

The Servicing Master Plan update is being conducted in accordance with the requirements of the Municipal Class Environmental Assessment (Class EA) which is an approved process under the Environmental Assessment Act. Master Plan projects incorporate Phases 1 & 2 of the Class EA process and also include consultation with the general public, government review agencies and affected property owners.

PUBLIC INVOLVEMENT:

Public consultation is a key component of this study. The proposed consultation plan provides for a public open house to be held in the fall of 2010 to review components of the Servicing Master Plan and to give interested parties an opportunity to provide input into the project. Details of the Public Open House are as follows:

Date:	**Wednesday November 24th, 2010**
Time:	**6:30 - 8:00 p.m.**
Location:	**Mount Forest Sports Complex, 850 Princess St., Mount Forest**

For further information on this project, or to review the Master Plan process, please contact the consulting engineers: B.M. Ross and Associates: 62 North Street, Goderich, Ontario, N7A 2T4. Telephone (Toll Free): (888) 524-2641. Fax: (519) 524-4403. Kelly Vader, Environmental Planner (e-mail: kvader@bmross.net).

Gary Williamson, Manager of Public Works
Township of Wellington North

This Notice issued November 10th, 2010

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 • f. (519) 524-4403
www.bmross.net

File No. 08158

TOWNSHIP OF WELLINGTON NORTH
SERVICING MASTER PLAN UPDATE

COMMUNITY OF MOUNT FOREST

NOTES FROM THE
PUBLIC INFORMATION MEETING

Details: November 24, 2010
Mount Forest Sports Complex

Open House: 6:30 – 8:00 p.m.

In Attendance: Mike Broomhead, Mayor
Raymond Tout, Mayor-Elect
Dan Yake, Councillor
Sherry Burke, Councillor-Elect
Mark Goetz, Councillor-Elect
Andy Lennox, Councillor-Elect

Gary Williamson, Public Works Superintendent
Barry Trood, Water/Sewer Foreman

Peter Harrison, BMROSS
Kelly Vader, BMROSS
Jane Simmons, BMROSS
Frank Vanderloo, BMROSS

Stakeholders: 6

1.0 Open House

The public open house was held in a meeting room at the Mount Forest Sports Complex. Attendees were asked to sign in upon arrival. Presentation boards were arranged around the perimeter of the room for public review. The display boards outlined the purpose of the Master Plan project, illustrated the project study area, explained the background and purpose of the study, and provided conceptual designs for future sanitary sewage collection and water supply servicing (including a possible site for a new water storage facility).

Those in attendance were provided with a handout summarizing the purpose and framework of the Master Plan study update (i.e., background information, status of investigations, deliverables). BMROSS and municipal staff were available to answer any questions from member of the public. Comment sheets were provided to permit input into study investigations.

2.0 Comments from Stakeholders

i) Representatives of an adjacent municipality in attendance at the meeting questioned the possibility of extending servicing to lands located outside of the designated service area. As this was beyond the mandate of the current study, they were directed to take this up with municipal representatives.

ii) A Councillor-elect for North Wellington asked BMROSS staff to identify the location of major infrastructure facilities located in Mount Forest and to highlight recommendations forthcoming from the Master Plan Update study.

iii) The Mayor-elect for North Wellington suggested that BMROSS staff attend a council meeting in January or February to present the results of the Master Plan Update study to new council members for their consideration.

The meeting concluded at approximately 8:15 p.m.

Meeting Notes Prepared by

B. M. ROSS AND ASSOCIATES LIMITED

Kelly Vader, Environmental Planner

SAUGEEN CONSERVATION
261123 Grey Rd. 28
Municipality of West Grey
(former Normanby Twp.)

Mailing Address:
R.R. 1, Hanover, ON
Canada N4N 3B8

Tel 519-364-1255
Fax 519-364-6990
www.svca.on.ca
publicinfo@svca.on.ca

SENT ELECTRONICALLY (kvader@bmross.net)
AND BY REGULAR MAIL

November 23, 2010

B.M. Ross and Associates Limited
Consulting Engineers
62 North Street
Goderich, ON
N7A 2T4

ATTENTION: Kelly Vader, Environmental Planner

Dear Ms. Vader:

RE: Township of Wellington North
Servicing Master Plan Update –
Community of Mount Forest

The Saugeen Valley Conservation Authority (SVCA) offers the following preliminary comments in response to your letter of November 4, 2010, regarding the above noted project. These comments should be considered preliminary and subject to change.

SVCA Regulation

Please be advised that portions of the Geographic Town of Mount Forest are subject to the SVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (Ontario Regulation 169/06). This Regulation requires that a person obtain the written permission of the SVCA prior to any "development" in a Regulated Area or "alteration" to a watercourse or wetland.

Subsection 28(25) of the *Conservation Authorities Act*, R.S.O. 1990, c. C.27 defines "development" as:

a) *the construction, reconstruction, erection or placing of a building or structure of any kind,*
b) *any change to a building or structure that would have the effect of altering the use or potential use of the building or structure, increasing the size of the building or structure or increasing the number of dwelling units in the building or structure,*
c) *site grading, or*
d) *the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere.*

According to Section 5 of Ontario Regulation 169/06, "alteration" includes straightening, diverting or interfering in any way with the existing channel of a river, creek, stream or watercourse.

For the Geographic Town of Mount Forest, the SVCA Regulated Areas includes the South Saugeen River, its floodplain, adjacent valley slopes and an appropriate setback, all unnamed tributaries, their respective floodplains and adjacent valley slopes, all wetlands and the area of interference surrounding the wetland.

Preliminary plans for future infrastructure that may be proposed as a result of the update to the Master Plan should be submitted for review by the Saugeen Valley Conservation Authority as early as possible.

Please note that if alterations are proposed that may affect the floodplain of the South Saugeen River or any other watercourses, the SVCA may require that you produce a hydrology report to assess these possible effects.

In addition to matters of interest relating to the SVCA's Regulation, the SVCA will be providing preliminary review of this project on behalf of Fisheries and Oceans Canada (DFO) with regard to the harmful alteration, disruption or destruction of fish habitat. The harmful alteration, disruption or destruction of fish habitat is prohibited unless authorized by the federal DFO pursuant to Section 35(2) of the *Fisheries Act*.

If, in the opinion of the SVCA, fish habitat may be altered, disrupted or destroyed as a result of this project and satisfactory mitigation cannot be achieved, the file will be referred to the DFO. The SVCA will determine if the involvement of the DFO is necessary once plans are submitted to this office for review.

If portions of this project are to occur at or in close proximity to the South Saugeen River or any other watercourse, a timing window may be applied.

Please keep this office informed as this Environmental Assessment progresses. Should you have any questions, please do not hesitate to contact our office.

Yours sincerely,

Candace Hamm

Candace Hamm
Regulations Officer

CH/CH
cc: Mark MacKenzie, Director, SVCA (via e-mail)