

Functional Servicing Report

Lawrence Street Plan of Subdivision

Park Lots 6 and 12
Geographic Town of Harriston
Town of Minto
County of Wellington

Prepared for:

J & J Metzger Construction Ltd.
103 Main Street
Palmerston, ON

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Executive Summary

Wilson-Ford Surveying & Engineering was retained by J & J Metzger Construction Ltd. to complete a Functional Servicing Report (FSR) of the property located at the end of Lawrence Street within the former Town of Harriston (formerly a portion of a school site), hereafter referred to as the 'Site'. The purpose of this FSR was to:

- evaluate the effects of the proposed change in land use, i.e. Plan of Subdivision on the existing municipal servicing infrastructure and watercourses;
- to determine if necessary improvements are required to the existing municipal servicing infrastructure to support the change in land use, and
- to determine possible mitigation measures to minimise any potential negative impacts to said infrastructure and watercourses.

The work was completed in accordance with established municipal engineering design principles, applicable guidelines (e.g., Ministry of the Environment), regulations and by-laws, and infrastructure information available from the Town of Minto.

In brief, the FSR has concluded that the Site can be serviced by existing municipal infrastructure (watermains, sanitary sewers) adjacent to the property.

1 Introduction

1.1 Background

Wilson-Ford Surveying & Engineering was retained by J & J Metzger Construction Ltd. to complete a Functional Servicing Report (FSR) to assess the servicing requirements relating to the proposed Plan of Subdivision at the end of Lawrence Street. This report will provide the conceptual framework for water distribution, sanitary sewage and storm drainage for the development of the Site prior to detailed design being undertaken. A Stormwater Management Report outlining the proposed quality and quantity controls for stormwater on this Site will be prepared under separate cover.

The Site will be serviced by existing local municipal sewers and watermains along Lawrence Street, which adjoins the Site. Service connections will be extended into the proposed Site.

1.2 Site Description

The subject property is a 1.0 ha undeveloped parcel located at the very end of the existing Lawrence Street comprised of a vacant portion of the former school site. The Site is bounded to the south by a storm water facility and a tier of residential lots along George Street; to the east by the residential lots fronting onto Lawrence Street; to the north by a primary school, and to the west by vacant lands. Lawrence Street is a year round municipally maintained road.

The Site is more or less level in topography with an average elevation of 383 m. From the Site the terrain slopes downward to the south and west toward the existing storm water facility and George Street.

The overburden onsite is expected to consist mainly of a loam textured till¹ (*Harriston Loam*) with few boulders and relatively stone free for the upper 0.6 m. Additionally, the Harriston Series is characterised by being imperfectly draining. A review of the two water wells² verified the presence of loam and silt to a depth of 3.9 m.

The Site is legally described as Park Lots 6 and 12 within the Geographic Town of Harriston, Town of Minto, County of Wellington. As shown in Figure 2 (Appendix 1) the Site is also referred to as PIN 71014-0206 (LT) and shown on Reference Plan 61R-21207 as Parts 1, 2, 3 and 4.

¹ Soil Survey of Wellington County, Ontario; Report No. 35 of the Ontario Soil Survey; Hoffman, DW, Matthews, BC and Wicklund, RE

² Map Well records, MOECC

1.3 Proposed Development

The proposed site development will see the regarding of the currently vacant lands to allow for the construction of a 10 lot residential Plan of Subdivision with access from Lawrence Street.

As shown in Figure 1 below the subject property is outlined in blue.

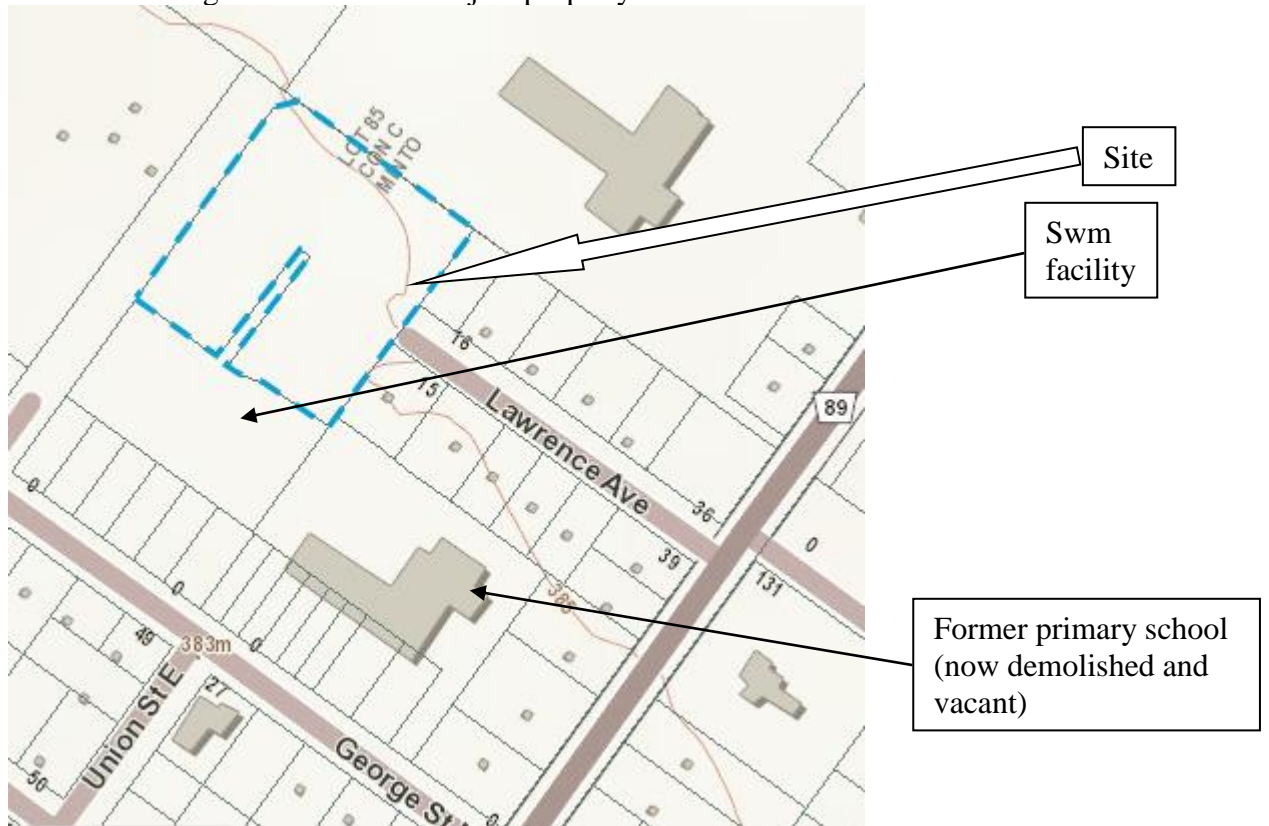


Figure 1 - Location Plan

2 Sanitary Servicing

2.1 Existing Sanitary Infrastructure

The proposed outlet for wastewater will be the existing sanitary sewer along George Street, and more specifically the existing sanitary manhole at the intersection of William and George Streets. Within said manhole there are already two inlet sewers both concrete in material and 250 mm in diameter coming from the west along George Street and the south from William Street. The singular outlet leading easterly along George Street is also 250 mm in diameter and concrete in material. A review of the outlet sewer from the William Street manhole is shown below in Table 1.

Sewer segment	Dia (mm)	Slope (%)	Length (m)	Sewer Capacity (L/sec)	Proposed flow from Site (L/sec)
MH at William to MH at Union	250	0.30	120	34.0	0.96

Table 1 - summary of sanitary infrastructure conditions

The proposed flow from the Site was developed in Table 2 below for 10 single-family residential dwellings. The total estimated anticipated sanitary flow from the development will be 0.96 L/sec, which represents 2.8 % of the existing sewer capacity.

2.2 Sanitary Demands

Sanitary sewers will be designed based on an average daily flow of 450 L/cap³; a peaking factor proportional to the design population, and a peak extraneous flow of 0.25 L/Ha*sec. Table 2 below summarises the utilised design criteria and resultant total peak flow that will be generated from the Plan of Subdivision of 0.96 L/sec.

Criteria	Input	Resultant
Site area	0.81 ha	
Proposed lots (EDU)	10	
Population ⁴	2.5 p/EDU	33.4 pers ⁵
Sewage generation	450 L/cap/day	
Average day Demand	450 L/cap/d * 33.4 pers	0.17 L/sec
Harmon Peaking factor	4.347	
Infiltration Allowance	0.25 L/sec/ha	
Peak sanitary flow	(0.17*4.347) + (0.25*0.81)	0.96 L/sec

Table 2 - sanitary sewage flow

³ Design Guidelines for Sewage Works, 2008; Ministry of Environment

⁵ Using a population density of 16.5 EDU/ha

2.3 Proposed Sanitary Servicing

All sanitary sewers are proposed to be 200 mm diameter PVC pipe with sufficient minimum cleansing velocity of 0.6 m/s.

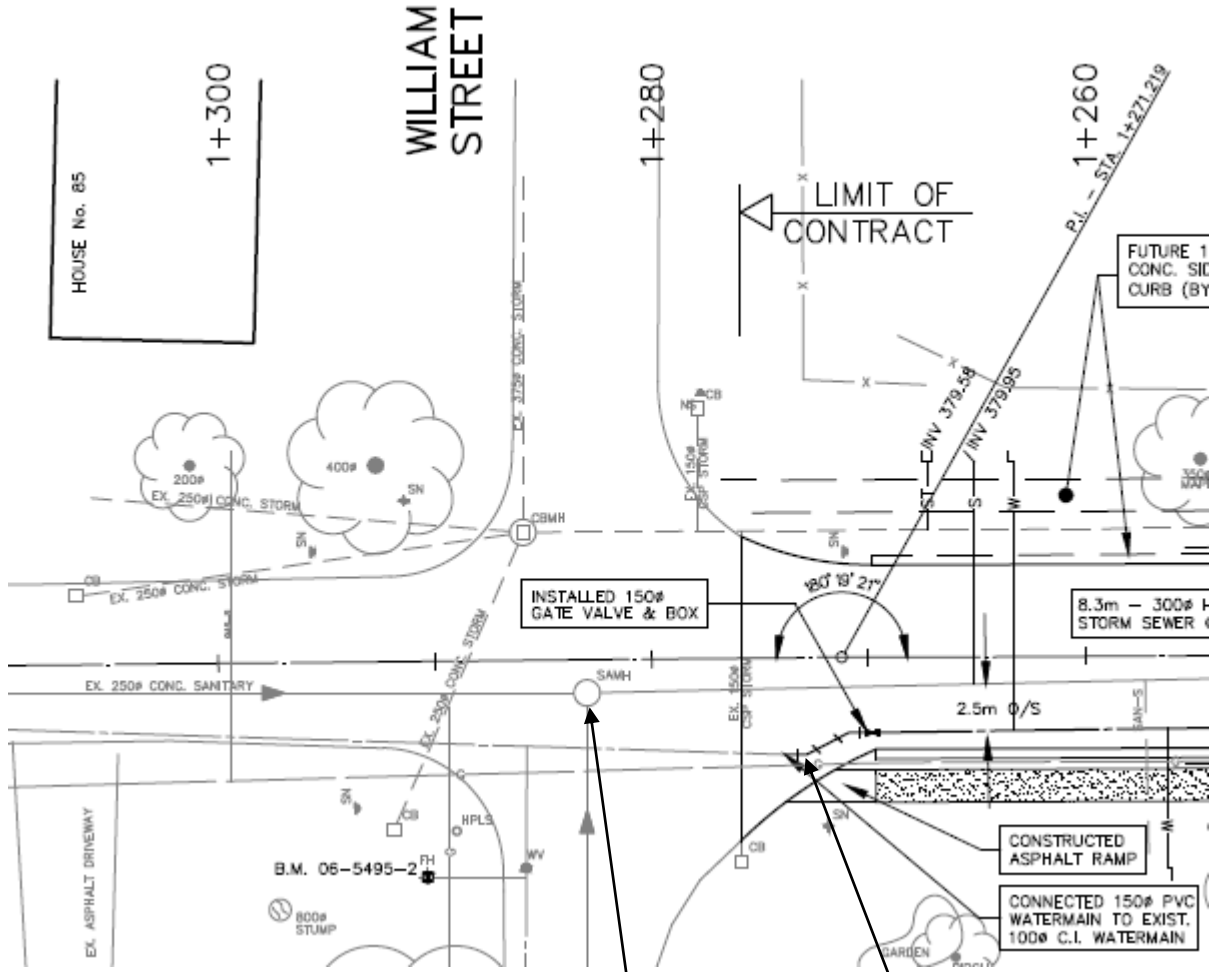


Figure 2 - as-built of George Street⁶

Outlet sanitary manhole from development

Outlet watermain from development

⁶ From engineering plans prepared by Triton Engineering Services (drawing no. 02, project M5495)

3 Water Servicing Network

3.1 Existing Conditions

The existing municipal water distribution system around the Site consists of a 100 mm diameter watermain along Lawrence Street, where it is dead-ended and along George Street there is both a 150 mm diameter watermain east of William Street and a 100 mm diameter watermain west of William Street. Existing fire hydrants are located at the end of Lawrence Street; at the south-westerly corner of William and George Street, and in front of #27 George Street east of William St. Based on flow testing obtained for the existing watermain, the system had a reported residual pressure of 18 psi (124 kPa) at a flow rate of 565 usgpm (35.6 L/sec) at the intersection of George and William Streets where the diameter is 100 mm. a much higher static/residual pressure was determined in front of #27 George Street with values of 60 psi (414 kPa)/41.5 psi (286 kPa) respectively.

It is the intent of the design to loop, or connect the watermain between Lawrence Street and George Street.

[Note – the existing watermain along Lawrence Street will be upgraded to a 150 mm diameter service in the near future]

3.2 Design Criteria

The water distribution system will be designed in accordance to Ministry of Environment guidelines⁷ which state that the drinking water system *should be designed* to satisfy the greater of the following:

- Maximum day demand plus fire flow, or
- Peak hour demand.

The maximum day demand and peak hour demand are based on the anticipated water consumption from the development and the fire flow is based on the type of development (see below).

3.3 Domestic Water Demands

The domestic water demand for the development was estimated at 450 L/cap/day². Table 3 below summarises the domestic water demand requirements for the Average day, Maximum Day and Peak Hour demand scenarios derived from Table 3-3 of reference 2 above for systems serving fewer than 500 people. Similar to the sanitary requirements, water usage was based on a population density of 2.5 pers/EDU.

⁷ Design Guidelines for Drinking-Water Systems, 2008; Ministry of Environment

Criteria	Input	Resultant
Proposed lots (EDU)	10	
Population ³	2.5 p/EDU	25 pers
Consumption	450 L/cap/day	
Average day Demand	450 L/cap/day * 25 pers	0.13 L/sec
Maximum day Factor	3.6	
Peak Hour Factor	5.4	
Maximum Day Demand	(3.6*0.13)	0.47 L/sec
Peak Hour Demand	(5.4*0.13)	0.70 L/sec

Table 3 - domestic water demands

3.4 Fire Flow Demands

Fire flow demands for developments are governed by a number of guidelines and criteria, such as the *Water Supply for Public Fire Protection (Fire Underwriters Survey (FUS), 1999)*, *Ontario Building Code (OBC)* and *AWWA Manual of Water Supply Practices M31 – Distribution System Requirements for Fire Protection*.

The fire flows are dependent upon several factors including the type of construction materials (e.g. wood frame v. masonry or brick), building height, and density of development (i.e. separation). For this development the fire flow requirements at a single family home (one or two storey), comprised either of wood frame, brick or masonry and separated by 10.1 to 30 m is shown in Table 4 below.

Occupancy	Fire Flow Required (L/min)	Duration (hr)
One family and two family dwellings not exceeding 2 storeys in height	3000	1.25

Table 4 - Fire Flow requirements

The watermain within the Plan of Subdivision is required to maintain a minimum residual pressure of 20 psi (138 kPa) when subject to maximum day + Fire Flow demands and a residual system pressure of 40 psi (275 kPa) under normal operating conditions. From Tables 3 and 4 above the value of maximum day + Fire Flow demands = 50.5 L/sec. When this demand, i.e. 50.5 L/sec (800 usgpm) is compared to the fire flow tests, the calculated (extrapolated) residual pressure is < 18 psi (124 kPa) which is below the minimum required 20 psi (138 kPa).

Because the watermain and fire hydrant along Lawrence Street will be upgraded to a larger diameter it is anticipated that sufficient pressure can be derived from this segment in the near future.

3.5 Fire Protection

Because the closest existing hydrant located at the end of Lawrence Street is 5 m distant from the proposed lots, and with the lot furthest away from said hydrant approximately 80 m, no new fire hydrant(s) will need to be installed within the Plan of Subdivision.

4 Stormwater Management

A Stormwater Management Report for this development has not only been prepared but the resultant facility has been installed under a separate MOE ECA. It identifies the stormwater quantity and quality controls under which this Site will operate to comply with the Town of Minto guidelines.

4.1 Existing Conditions

There are no municipal storm sewers adjacent to the Site, and because of the prevailing topography there are no external lands that will drain onto the Site. The existing storm water management facility will provide an outlet for the post-development conditions for this development.

4.2 Minor Storm Drainage System

An onsite minor storm drainage system, consisting of curb and gutter within the development, manholes and local storm sewers where needed, will be designed to convey the 1:5 year storm event in accordance with the Town guidelines¹.

The pre-development condition of the site is vacant open space, whereas the post-development condition will change to a more residential environment with landscaped lawns, hard top driveways and hard top roadways increasing the runoff coefficient and therefore volume of water.

No onsite stormwater controls have been designed to restrict flows to the new storm sewer system.

4.3 Major Storm Drainage System

The major storm system is a conveyance system for flows in excess of the minor system flows designed for a 1:100 year storm event.

For this development, the grading design will be prepared such that the surface grades of roads and landscaped areas will direct surface drainage away from the anticipated surcharged sewers and ditches to approved outlets, such as the existing onsite detention facilities and/or roadside ditches.

5 Sediment and Erosion Controls

Erosion and sediment controls shall meet the requirements of the most recent version of the MOE Stormwater Management Planning and Design Manual⁴ at the time of construction.

Sediment and erosion controls will be implemented both during construction of applicable infrastructure and during lot development. These measures will include:

- Installation of silt control fencing at strategic locations around the perimeter of the site;
- Maintaining sediment and control structures in good repair including periodic cleaning s required) until such time that the Town approved their removal;
- During individual construction of homes within the development, silt barriers to be constructed, as appropriate to prevent eroding of materials into roadside drainage system. Sedimentation control to be in the form of siltation fences and/or shallow excavated sediment traps (moats) placed in the direction of flow from the construction site.

6 Conclusion

6.1 Water Distribution

The proposed development will be serviced from a looping of the existing 100 mm diameter watermain currently dead-ended at the end of Lawrence Street to the 150 mm diameter watermain along George Street. Through a combination of piping and existing fire hydrants both the maximum daily demand and fire flow consumption should be satisfied.

6.2 Sanitary Sewage

Sanitary sewage generated from this development will be conveyed to the existing sewer along George Street, and more specifically at the intersection of George and William Streets. It is estimated at the current proposed scale of the Plan of Subdivision, i.e. 10 lots that the post-development peak sanitary flow to be approximately 0.96 L/sec from the Site.

6.3 Storm Sewage

Minor storm drainage for the proposed development will be conveyed to the curb and gutter within the proposed cul-de-sac and major storm flows will be directed away from the proposed residential dwellings toward Lawrence Street. The overall rate of discharge from the proposed site development under post-development conditions is less than the overall discharge rate from the existing Site in pre-development conditions. For details concerning stormwater management refer to the Approval ECA.

7 Limitation of Liability

The information in this report is based partly on information provided by others and visual observations identified herein. This type of limited investigation is designed to provide information to support an overall Plan of Subdivision application. Sampling and analysis of soils, groundwater, and other media was not carried out as part of the investigation.

It should also be noted that current environmental guidelines and regulations are subject to change, and such changes, when put into effect, could alter the conclusions and recommendations noted throughout this report.

Wilson-Ford Surveying & Engineering

Greg Ford, P. Eng. (civil), OLS



Appendix 1 – Figure 1



Figure 3 - Block map of Site courtesy of LRO records

Appendix 1 – Figure 2

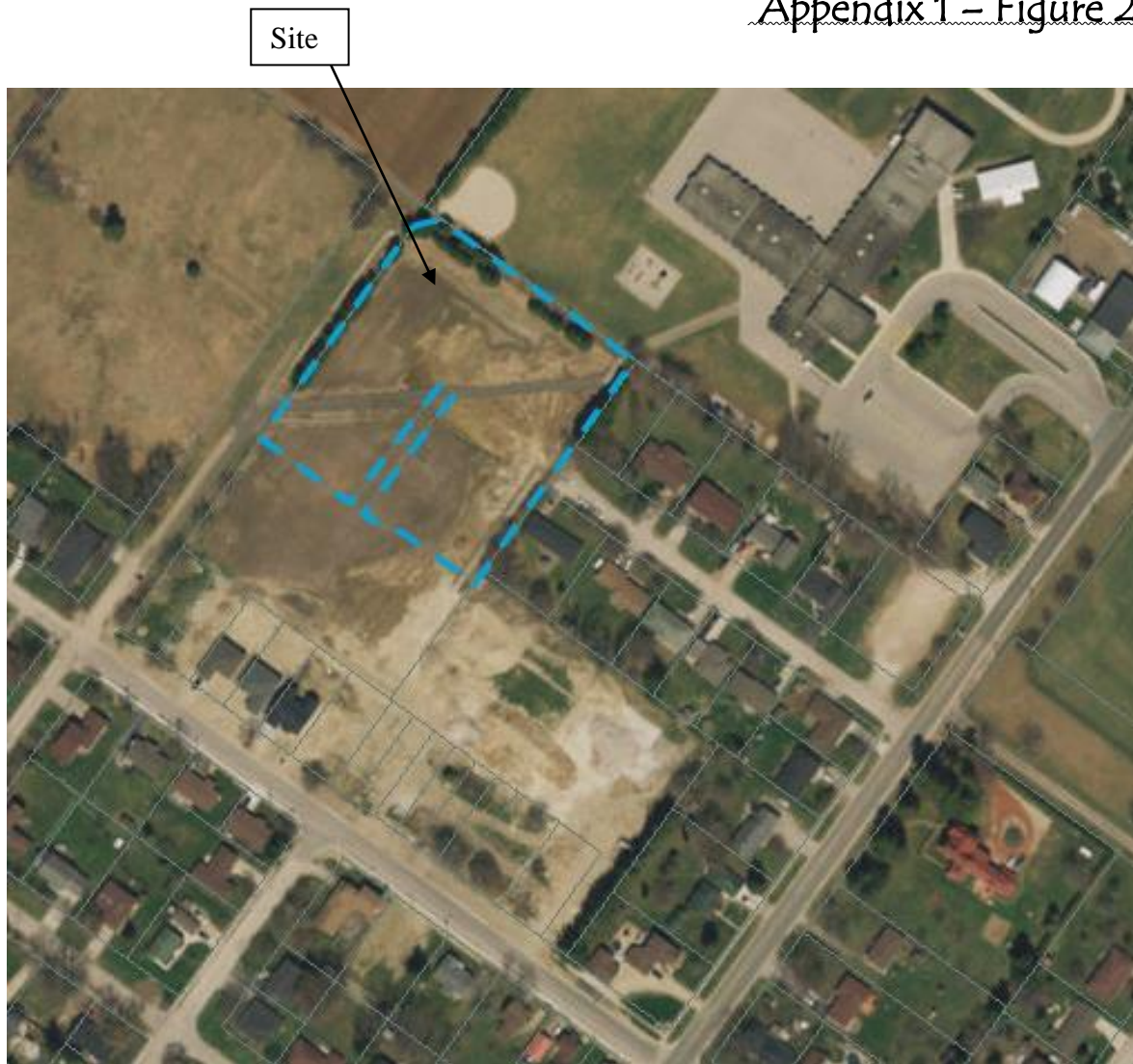


Figure 4 – aerial view of proposed Plan of Subdivision (courtesy of MNR).