



**May 2013**

**REPORT ON**

**Conceptual Site Servicing and  
Stormwater Management  
Lakeland Meadows Subdivision Phase 2**

**Submitted to:**  
2246557 Ontario Inc.  
202-1422 Wellington St. W.  
Ottawa, ON  
K1Y 0X7

**REPORT**

**Report Number:** 10-1125-0034

4 copies – 2246557 Ontario Inc  
2 copies – Golder Associates Ltd.

  
**A world of  
capabilities  
delivered locally**





# Table of Contents

**1.0 INTRODUCTION..... 1**

**2.0 MUNICIPAL REQUIREMENTS ..... 2**

**3.0 STORMWATER ..... 3**

    3.1 Proposed Stormwater Management Facilities ..... 3

        3.1.1 Pre-Development Peak Flow Rates - 1:100 Year Event ..... 3

        3.1.2 Post-Development Peak Flow Rate – 1:100 Year Event..... 4

    3.2 Quality Control ..... 5

    3.3 Infiltration ..... 5

    3.4 Fish Habitat Compensation ..... 6

    3.5 Storm Sewer Design..... 6

**4.0 SANITARY SERVICING ..... 7**

    4.1 Septic Tanks..... 7

    4.2 Small Diameter Sewers ..... 8

**5.0 WATER SERVICING ..... 9**

**6.0 SUMMARY..... 10**

**7.0 CLOSURE..... 11**

**APPENDICES**

**APPENDIX A**

Drawings:

Pre-Development Drainage Plan, 10-0034-PD1

Post-Development Drainage Plan, 10-0034-PD2

Site Servicing Plan, 10-0034-SS1



### 1.0 INTRODUCTION

Golder Associates Ltd. was retained by Lakeland Meadows Ltd. for preparation of this conceptual site servicing report. This site servicing report has been prepared to accompany a Draft Plan application to the City of Ottawa in support of Phase 2 of the proposed Lakeland Meadows Subdivision, located adjacent to Old Prescott Road, in the City of Ottawa, Ontario. The overall property measures approximately 59.49 hectares, which includes Phases 1 and 2 of the development.

The development is proposed in two phases and includes approximately 140 apartment units and 420 lots. Phase 1, which has already been Draft Plan approved, contains 34 rural lots on approximately 16.186 hectares. Phase 2 of the development includes 140 apartment units, 164 single lots, 86 semi-detached lots, and 136 townhouse lots on approximately 43.299 hectares, refer to Site Servicing Plan.

It is proposed that all units in Phase 2 will be serviced through the communal water and sewage treatment and conveyance systems in the adjacent Shadow Ridge Subdivision. Stormwater will be collected and transported to a stormwater pond in the Shadow Ridge Subdivision property south of the Lakeland Meadows Subdivision, pending resolution of a cost-sharing agreement.

Upon Draft Plan Approval a detailed design report will be submitted to the Ontario Ministry of the Environment (MOE) in support of an application for amendments to the sewage treatment facility, water treatment facility (including wellhead protection areas), and the permit to take water for the Shadow Ridge Subdivision as well as new Environmental Compliance Approvals (ECA) for the watermains, sanitary sewers, and storm sewers.



### 2.0 MUNICIPAL REQUIREMENTS

The City of Ottawa and South Nation Conservation (SNC) have the following requirements for the design of the stormwater management facilities, storm and sanitary sewers and the watermain:

- 1) The site is included within the Shield's Creek Subwatershed Study, which outlines the basic quality and quantity targets for stormwater management design within the study area. The targets include:
  - a. Attenuation of the 1:2, 1:5 and 1:100 year storm events to pre-development levels;
  - b. Removal of a minimum of 70% of Total Suspended Solids (TSS); and
  - c. Provide infiltration to reduce the volume of stormwater runoff.
- 2) The minimum storm sewer size will be 300 mm diameter.

Only the 1:100 year storm event has been presented in this conceptual design. The 1:2 and 1:5 year storm events will be analyzed during the detailed design.



### 3.0 STORMWATER

#### 3.1 Proposed Stormwater Management Facilities

Stormwater from the proposed development (Phases 1 and 2) will be collected within the proposed storm sewer and ditch network and conveyed to a stormwater management wet pond to be located on the Shadow Ridge Subdivision to the south, pending resolution of a cost-sharing agreement.

##### 3.1.1 Pre-Development Peak Flow Rates - 1:100 Year Event

Pre-development drainage conditions on site consist of a combination of pasture and agricultural lands. Drainage patterns and catchment boundaries have been delineated from topographic maps.

Areas 1 to 4, 6, and 8 to 14 are included in the pre-development flow calculations. The greatest time of concentration for each individual area is used to determine the peak pre-development flows. Area 5 drains off site to the north and Area 7 is in an area with a local depression and is not expected to direct flow on to the property. As such, it is not included in the flow rate calculations.

Runoff from areas 6, 8 and 14, as shown on the Pre-Development Drainage Plan, drawing 10-0034-PD1, drain to the Quailles Municipal Drain. Runoff from the remainder of the drainage areas eventually discharge to the Kehoe Municipal Drain.

The following calculations provide the 1:100 year pre-development peak flow rates for the site (refer to the Pre-Development Drainage Plan, drawing 10-0034-PD1, in Appendix B). Runoff coefficients, as presented, include a 25% increase, up to a maximum value of 0.95, for the 1:100 year storm.

##### 1:100 Year Pre-development Flow to the Quailles Municipal Drain

###### **Areas 6, 8 and 14**

A = 14.177 ha

Estimated time of concentration (Tc) = 121.5 min (calculated using the airport formula)

Rainfall intensity (i) = 30.82 mm/hr

Runoff Coefficient (C) = 0.125 (sand loam, pasture, 0-5% slope)

$$\begin{aligned} \text{Pre-development flow rate} &= Q \\ &= 2.78AiC \\ &= 2.78(14.177)(30.82)(0.125) \\ &= 151.8 \text{ L/s} \end{aligned}$$

To meet allowable pre-development flow rates, the post-development peak release rate to the Quailles Municipal Drain should not exceed 151.8 L/s.

##### 1:100 Year Pre-development Flow to the Kehoe Municipal Drain

Runoff from areas 1, 4 and 9 to 13 currently flow towards the Kehoe Municipal drain. As well, runoff from areas 2 and 3 will be contained within the development. The runoff from these areas will be directed to the stormwater pond on the Shadow Ridge Subdivision. The total pre-development area draining from the Lakeland Meadows



Subdivision to the Kehoe Drain is 46.039 hectares with a runoff coefficient of 0.125. The pond will be designed based on these parameters.

### 3.1.2 Post-Development Peak Flow Rate – 1:100 Year Event

Runoff for the post-development conditions was determined using an estimated 20 minute inlet time and an average of 1 meter per second travel velocity through the storm sewers. Refer to The Post-Development Drainage Plan, drawing 10-0034-PD2, for the post-development drainage areas.

Runoff from Area 2 includes apartment Block 231 and a portion of the single lots to the south of the apartment block. These areas total approximately 1.141 hectares and drainage will eventually make its way to the Quailles Municipal Drain. Area 3 will drain to the existing drainage ditch along Lakeshore Drive, as per the stormwater management report for Phase 1 of the development.

Post-development runoff to the off-site stormwater management pond will consist of Areas 1, 4, 5, 6 and 7. Runoff for the post-development conditions was determined using a time of concentration of 36.2 minutes (estimated using the Airport Formula).

#### 1:100 Year Post-development Flow to the Quailles Municipal Drain

##### **Apartment Block 231 and Single Lots**

A = 1.141 ha (0.796 ha for apartment A, 0.345 ha for single lots)

Estimated time of concentration (Tc) = 20 min

Rainfall intensity (i) = 106.24 mm/hr

Runoff Coefficient (C) = 0.45 (0.48 for Block 231, 0.38 for single lots and ROW)

$$\begin{aligned} \text{Post-development flow rate} &= Q \\ &= 2.78AiC \\ &= 2.78(1.141)(106.24)(0.45) \\ &= 151.6 \text{ L/s} \end{aligned}$$

Stormwater management will need to be provided on Apartment Block 231 to reduce the runoff coefficient to 0.48 for the 1:100 year storm event, or a runoff coefficient of 0.38 for the 1:5 year storm event.



### 1:100 Year Post-development Flow to the Kehoe Municipal Drain

Average runoff coefficients used are as follows:

Land Use	Runoff Coefficient	1:100 year Runoff Coefficient	Area (ha)
Apartments Block 232	0.70	0.88	1.263
Park	0.20	0.25	2.431
School	0.40	0.50	3.071
Rural Lots (Phase 1)	0.20	0.25	16.186
Singles	0.30	0.38	15.294
Semi-detached	0.40	0.50	5.538
Townhouse	0.60	0.75	4.217
Roads	0.50	0.63	9.728
Off-Site (Areas 4, 5, 6, 7)	0.10	0.125	4.115

Total Area = 61.843 hectares

Estimated Time of Concentration = 36.2 min

Rainfall intensity (i) = 70.71 mm/hr

Runoff Coefficient (C) = 0.42 (area weighted average)

In order to meet pre-development flow rates, the storm sewer system and overland flow routes through the Shadow Ridge Subdivision will need to convey the 61.843 hectares of uncontrolled flow to the proposed stormwater management wet pond. The wet pond in the Shadow Ridge Subdivision will need to attenuate the uncontrolled flow rate to the pre-development flow rate for the 1:100 year storm event with respect to an area of 61.843 hectares and a runoff coefficient of 0.42.

### 3.2 Quality Control

Runoff will be collected in rear yard swales and curb and gutter systems to be conveyed to the Shadow Ridge Subdivision's stormwater management pond.

The rear yard swales with minimum grades will help to trap suspended particles and protect against erosion. Low flow velocities in the ditches in Phase 1 will encourage the removal of fine suspended particles. The stormwater management pond on Shadow Ridge will be designed to provide quality treatment.

### 3.3 Infiltration

Rear yard swales and grass-lined ditches (Phase 1) at low flow velocities will promote infiltration into the native sandy soils. Rear yard catch basin leads (Phase 2) will be perforated to encourage infiltration of storm runoff.



### 3.4 Fish Habitat Compensation

Fish habitat compensation to address the potential loss of habitat within the existing drainage ditches for Phase 2 will be located within the Shadow Ridge Subdivision property or could be located elsewhere in the watershed, to be determined based on consultation with SNC.

### 3.5 Storm Sewer Design

The storm servicing of the development will be by a gravity sewer system draining to the Shadow Ridge Subdivision where it will be attenuated by the stormwater management wet pond. The storm sewers will be designed to convey the peak runoff rate from the 1:5 year storm event.

Roads will be saw-toothed as much as possible with a maximum depth of 0.30 m to limit ponding resulting from the 1:100 year storm event. Orifices will be installed in the catch basins to restrict the inflow into the storm sewer system to the peak flow rates for the 1:5 year storm event. The size and type of the orifice will be determined in the detailed design. This will reduce the requirements of the stormwater management pond in the Shadow Ridge Subdivision.

The proposed storm sewers will require an ECA from the MOE.





## 4.0 SANITARY SERVICING

Sanitary flows from Phase 2 will be directed to the Shadow Ridge Subdivision to be treated at the communal peat filter and constructed wetland treatment system. Data from the modules already in use for Phase 1 of Shadow Ridge indicate that 30 to 45 homes can be served with each module. As a result, an additional 12 to 15 peat filters will be installed to accommodate the Phase 2 development.

A dedicated dosing chamber will be installed near the peat beds to handle the flows from Lakeland Meadows Subdivision. From the dosing chamber the wastewater will be directed to communal peat filter and constructed wetland modules dedicated to Lakeland Meadows. These modules will be located adjacent to the Shadow Ridge modules.

An amendment of the existing approvals will be required from the MOE for the additional peat filter beds.

### 4.1 Septic Tanks

Similar to Shadow Ridge, it is proposed that septic tanks will be located at each residence or block of residences within registered municipal easements. Periodic pump-outs will be coordinated through the City of Ottawa. The tanks at separate residences will be sized based on the minimum criteria as established in Reg. 358/91 with larger tanks used at residences with fixture units in excess of 25 (as defined by the plumbing code). The septic tank sizing is summarized in the following table.

	Fixture Units $\leq$ 25	Fixture Unites $>$ 25
Up to 2 bedroom	2,700 litres	3,600 litres
3 bedroom	3,600 litres	4,500 litres
4 bedroom	4,500 litres	6,000 litres
5 bedroom	6,000 litres	6,750 litres

Single tanks serving multiple residences will be sized with a storage volume equal to the sum of the storage volumes for each individual dwelling.

The effluent from the septic tank will discharge by gravity to a small diameter gravity sewer system located in the municipal road allowance.



## 4.2 Small Diameter Sewers

The sanitary servicing for Phase 2 of the development will be by a small diameter gravity sewer system draining to the Shadow Ridge Subdivision to the South. The following calculations provide the peak sewage design flow from Phase 2 of the development.

Dwelling Type	Apartment	Single	Semi-detached	Townhouse
Number of Units	140	164	86	136
Population per Unit	1.8	3.4	2.7	2.7
Population	252	557.6	232.2	367.2
Average Flow per Capita (L/cap/d)	350	350	350	350
Peaking Factor	3.7	3.7	3.7	3.7
Peak Population Flow (L/s)	3.78	8.36	3.48	5.50
<b>Total Peak Population Flow (L/s)</b>	<b>21.12</b>			

The small diameter gravity sewers will be constructed using high-density polyethylene (HDPE) pipe with fused ends. As well, cleanouts will be installed along the length of the sewer to eliminate any mechanical connections at maintenance holes. No extraneous flows are expected as the piping system will not have any maintenance holes and will be pressure tested.

The sanitary sewers will be designed as part of the Phase 2 detailed designs. The proposed sanitary sewers will require an ECA from the MOE.



### 5.0 WATER SERVICING

The water servicing for Phase 2 will be provided by the communal water distribution system from the Shadow Ridge Subdivision. It will be connected to stubs at the south end of Street No. 2 and Street No. 3, as well as the street abutting Street No. 8 between lots 66 and 195 (refer to Drawing No. 10-0034-SS1).

The following calculations estimate the domestic water demands for Phase 2 of the development based on the City of Ottawa Design Guidelines.

Total Population = 1,409

Average Demand per cap per day = 350 L/cap/day

Average Demand = 493,150 L/day = 5.71 L/sec

Max Daily Demand Factor = 2.5 x average day

Max Daily Demand = 1,232,875 L/day = 14.27 L/sec

Max Hourly Demand Factor = 2.2 x max day

Max Hourly Demand = 2,712,325 L/day = 31.39 L/sec

The system currently consists of two communal groundwater wells and a pump station, but will be upgraded with the construction of a storage reservoir, equipped with variable speed pumps to pressurize the system.

The above calculations do not include flow for fire protection, as it is not required.

The minimum size of watermain through the site will be based on the demand flow for each section. The size of the main distribution line will be determined in the detailed design. Depending on the staging of construction, temporary hydrants will be installed at the ends of the staging to provide adequate locations for flushing and operation of the system.

The permit to take water for the communal water distribution system in the Shadow Ridge Subdivision will be amended based on the required flow when the storage reservoir has been designed. The well head protection area boundaries will also need to be updated to reflect the new pumping rate when the updated permit is received.



### 6.0 SUMMARY

The development of the Lakeland Meadows Subdivision Phase 2 is proposed using communal sanitary and water servicing from the Shadow Ridge Subdivision. Stormwater will be managed in the adjacent Shadow Ridge Subdivision. A stormwater management pond on the Shadow Ridge property will provide adequate storage to accommodate runoff resulting from all storm events up to and including the 1:100 year storm event.

The water, sanitary and storm services for the proposed development will require approval from the MOE.

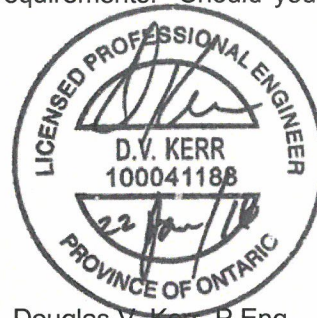


## 7.0 CLOSURE

We trust the information presented in this report meets your requirements. Should you have any questions, please contact the undersigned.

**GOLDER ASSOCIATES LTD.**

For:  
Daniel Hsia  
Civil/Environmental Consultant



Douglas V. Kerr, P.Eng.  
Associate, Senior Engineer

DLKH/SWT/DVK/lc

n:\active\2010\1125 - land engineering\10-1125-0034 lakeland meadows\lakeland meadows - phase ii\conceptual site servicing report may 10, 2013.docx



# APPENDIX A

## Drawings:

Pre-Development Drainage Plan, 10-0034-PD1

Post-Development Drainage Plan, 10-0034-PD2

Site Servicing Plan, 10-0034-SS1

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

Africa	+ 27 11 254 4800
Asia	+ 852 2562 3658
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

[solutions@golder.com](mailto:solutions@golder.com)  
[www.golder.com](http://www.golder.com)

**Golder Associates Ltd.**  
**32 Steacie Drive**  
**Kanata, Ontario, K2K 2A9**  
**Canada**  
**T: +1 (613) 592 9600**

