1730 Wilhaven Road
City of Ottawa

Servicing Options Statement and Conceptual Stormwater Management Report

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1505 Laperriere Avenue
Ottawa, ON, K1Z 7T1
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Appendices

1.0 INTRODUCTION

Stantec has been retained to provide the following Site Servicing / Stormwater Management Report in order to satisfy the requirements for an application for Draft Plan of Subdivision. The parcel of land to be redeveloped is fronting along Wilhaven Drive bounded by O'Toole Road to the east (Refer to Appendix A Key Map). The site is located on Part Lots D and E, Concession 7, Geographic Township of Cumberland, County of Russell in the City of Ottawa. The total site area is approximately 19.91 hectares (49.2acres) of land. Refer to Appendix A of this report for the Existing Conditions Plan, Keymap and Draft plan of Subdivision.

This report outlines the Site Servicing and Stormwater concepts and should be read in conjunction with the following reports.

- Terrain Analysis and Hydrogeological Study, Report # PH1236-REP.01 prepared by Paterson Group.
- Phase 1 Environmental Site Assessment, Report #PH1236-REP.02 prepared by Paterson Group
- Preliminary Geotechnical Investigation, Report #PH1236-REP.03 prepared by Paterson Group
- Archaeological Assessment 1730 Wilhaven Road prepared by Adams Heritage, report # CIF# P003-260-2009
- Tree Conservation Report Nov 30 2009, prepared by Muncaster Environmental Planning.
- Planning Rationale Report for 2183144 Ontario Inc, December 2009

2.0 CONCEPTUAL STORMWATER MANAGEMENT

As there is not currently a surface outlet or watercourse to which stormwater could be directed, the stormwater plan will promote infiltration within the existing lots and use back to front drainage within the lots to provide drainage to the proposed roadside ditch. Roadside ditches (or swales) will be used to collect the runoff.

The assumptions regarding the surficial soils, based on available soils mapping and geotechnical information obtained from the adjacent lands, will be explained as part of the Hydrogeological and Terrain analysis.

2.1 OVERLAND FLOW

Properly engineered overland flow routes are essential when designing stormwater management. The flow routes provide emergency conveyance for extreme rainfall or flooding events, preventing basements in the subdivision from becoming inundated. The proposed dwellings will be designed with sump pits and pumps to drain the footings which will outlet to the front of the proposed dwellings ultimately reaching the proposed ditches within the right of way. Overland flow routes for storm runoff will be directed towards Wilhaven Drive via the proposed ditches.

2.2 CONCEPTUAL STORMWATER MANAGEMENT OBJECTIVES

The proposed residential development will have four main stormwater management objectives during the detailed design phase and throughout construction:

1. Water Quantity Control
2. Water Quality Control
3. Vertical Clearance between Unit Grades and Spill Grades
4. Erosion Control

The first objective is to maintain water quantity, specifically to ensure that post-development peak flows are controlled to pre-development levels. Therefore, the design criteria used in this preliminary analysis is that the 5 year post peak should be equal to or less than the 5 year pre, and that the 100 year post peak should be equal to or less than the 100 year pre.

As per the existing drainage information on the attached plans, it is proposed that the outlet for this site be the existing roadside ditches along the south side of Wilhaven Dr., which eventually discharges into the Ottawa River.

When calculating the pre-development runoff conditions a number of factors and variables will be used. The calculations take into consideration the total site area, the total grassed and landscaped areas, the total gravel areas, the total asphalt and hard surface areas and the total roof areas.

Each of the above mentioned areas have different levels of infiltration and therefore are assigned different runoff coefficients as per City of Ottawa guidelines.

Existing grassed and landscaped areas can have a runoff coefficient of 0.1 to 0.40. Existing gravel areas can have a runoff coefficient of 0.25 to 0.70. Existing paved areas and Roofs have a runoff coefficient of 0.90.

Once each of the above areas are known they are multiplied by their respective runoff coefficients and then added together. This number is then divided by the total site area to achieve a pre-development runoff coefficient (see Appendix B Drawing PRE).

Runoff calculations presented within this report are derived using the rational method formula:

Q=2.78 CIA

Where C = runoff coefficient
I = rainfall intensity
A = tributary area

Drainage areas were delineated (see Appendix B Drawing POST) and divided into "POST-1" and "POST-2". A pre-development time of concentration was determined and allowable flows of 215.4 L/s and 363.9 L/s were calculated for the 5 year and 100 year events respectively. The storage volumes that would be required to attenuate post-development flows to these target rates were calculated using the table below:

QUANTITY STORAGE REQUIREMENTS (5 year)

20.562 = Area(ha)
0.24 = C (post-development, based on calculated imperviousness)

Return Period	Time (min)	Intensity (mm/hr)	* Flow Q (L/s)	Allowable Runoff (L/s)	Net Runoff To Be Stored (L/s)	Storage Req'd m^3
	15	83.56	1145.7	215.4	930.2	837.2
	20	70.25	963.2	215.4	747.8	897.4
5 YR	25	60.90	835.0	215.4	619.5	929.3
	30	53.93	739.4	215.4	524.0	943.2
	35	**48.52**	**665.2**	**215.4**	**449.8**	**944.6**
	40	44.18	605.8	215.4	390.4	936.9
	45	40.63	557.1	215.4	341.6	922.4
	50	37.65	516.3	215.4	300.8	902.5
	55	35.12	481.6	215.4	266.2	878.3
	60	32.94	451.7	215.4	236.3	850.5

QUANTITY STORAGE REQUIREMENTS (100 year)

20.562 = Area(ha)
0.24 = C (post-development, based on calculated imperviousness)

Return Period	Time (min)	Intensity (mm/hr)	* Flow Q (L/s)	Allowable Runoff (L/s)	Net Runoff To Be Stored (L/s)	Storage Req'd m^3

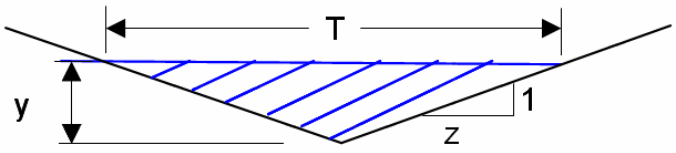
	20	119.95	1644.7	363.9	1280.7	1536.9
	30	**91.87**	**1259.6**	**363.9**	**895.7**	**1612.2**
100 YR	40	75.15	1030.3	363.9	666.4	1599.4
	45	69.05	946.8	363.9	582.8	1573.6
	50	63.95	876.9	363.9	513.0	1538.9
	55	59.62	817.5	363.9	453.6	1496.8
	60	55.89	766.4	363.9	402.5	1448.8
	65	52.65	721.8	363.9	357.9	1395.9
	70	49.79	682.7	363.9	318.7	1338.7
	75	47.26	647.9	363.9	284.0	1278.0

As the table shows, the maximum amount of required storage occurs during the 100 year event, and is approximately 1612 m^3. Refer to Appendix B for Detailed Stormwater Calculations.

The initial design shows that the right-of-way (ROW) cross-section is rural, providing open channel ditches on each side of the road. It is possible to store the Ditches were sized using the table below to provide sufficient volume to meet the required storage as calculated above.

Area ID	Length (m)	Depth "y" (m)	Shape	Side Slopes "z"	Top Width "T" (m)	Area (sq.m)	Volume (cu.m)
POST-1	755	0.6	Triangular	3:1	3.6	1.08	815.4
POST-2	755	0.6	Triangular	3:1	3.6	1.08	815.4

The diagram below presents the potential arrangement of the proposed ditch cross-section.



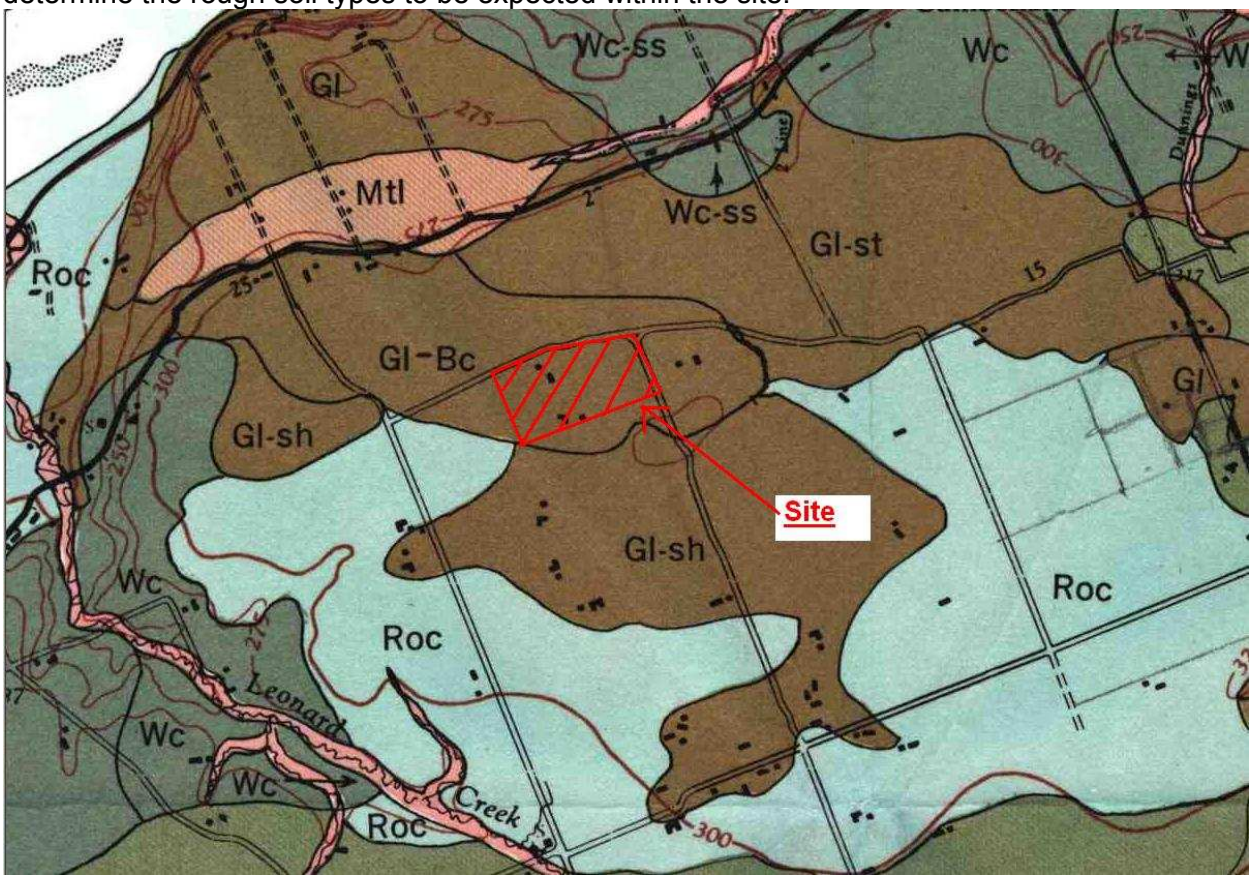
As can be seen from the ditch table, 815 m^3 is provided on each side of the road, or 1631 m^3 in total. As this is in excess of the required storage of 1612 m^3, ditch storage should be sufficient to attenuate post-development flows to the target rate.

The second objective is to maintain water quality. The majority of the area within the lots will be left undisturbed and as a result water quality will not be required within these areas. Lot level controls such as reduced lot grading will be implemented as best as possible and roof leaders will be directed to grassed surfaces which will provide initial filtration of sediment, along with best management practices to provide the required level of total suspended solids (TSS) removal for the proposed site.

The conveyance system to be used within this subdivision will be an open-ditch system. As per the Ministry of the Environment standards all roadside ditches will be grassed with a longitudinal slope of 0.5% where permitted. All swales will be constructed at near-minimum grades to ensure stormwater runoff will have the opportunity to infiltrate into the existing ground and filter the small particles. Both the Ministry of the Environment and the Ministry of Transportation have recognized that grassed ditches provide significant quality treatment. The MTO has found that triangular grassed ditches routinely remove in excess of 60 % TSS. Driveway culverts will be installed within the existing ditch lines, sized for the 5 year peak flow. All road culverts will be sized to convey 10 year peak flows.

During the detailed design process it will be determined if any measures will be undertaken within the proposed ditches in forms of end of pipe SWM facilities or infiltration trenches beneath the proposed ditchlines.

The Soil Survey of Russell and Prescott Counties (Canada Department of Agriculture, 1962) was consulted to determine the soil infiltration potential and the map below was used to determine the rough soil types to be expected within the site.



The site lies within an area of Grenville Loam and Bearbrook Clay complex ("Gl-Bc"). The Soils Survey describes Grenville Loam as generally stony with good drainage. Bearbrook Clay however, is described as clay textured with poor drainage potential. As the site soils are a complex of these two soil types, it is likely that the infiltration capacity of the soil is not great, and should not be relied upon to provided sufficient percolation for an infiltration design. It should

therefore be assumed that all excess runoff volume beyond the allowable outflow must be detained on-site in the proposed ditches. This should be verified via an on-site geotechnical investigation.

Due to the length of the open ditches to promote infiltration and settle and minimal change in the post development runoff coefficient for this site additional Quality systems have not been investigated.

2.3 EROSION AND SEDIMENT CONTROL

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents:

1 Limit extent of exposed soils at any given time.

2 Re-vegetate exposed areas as soon as possible.

3 Minimize the area to be cleared and grubbed.

4 Protect exposed slopes with plastic or synthetic mulches.

5 Install silt fence to prevent sediment from entering existing ditches.

6 Provide sediment traps and basins during dewatering.

7 Install filter cloth between catchbasins and frames.

8 Plan construction at proper time to avoid flooding.

Establish material stockpiles away from watercourses, so that barriers and filters may be installed **(see Appendix B, Drawing EC-1).**

The contractor will, at every rainfall event, complete inspections and guarantee proper performance. The inspection is to include:

1 Verification that water is not flowing under silt barriers.

2 Clean and change filter cloth at catch basins.

The third objective is to protect houses from flooding during the 1:100 year rainfall event. Minimimum grading of 2% within the front, rear and side yard grades will be required to ensure adequate drainage away from the proposed dwelling. All spill points within the proposed development will ensure that 0.3m freeboard is achieved from any foundation opening at the residential dwelling. All roadside ditches will be constructed to adequately convey the 100 year storm event.

The fourth objective is to provide adequate Erosion and Sediment control during the construction phase of this development. Additionally permanent erosion and sediment control

measures may be required on a permanent basis and will be identified during the detailed design portion of this development. Prior to construction, silt fences will be installed within the development, as well as rock flow dams and straw bales at all future outlet locations from the proposed development.

During construction of the individual lots, measures should be undertaken to ensure that sediment is not directed to the roadside ditch and grass should be established within the lots shortly after lot grading has been completed.

3.0 SERVICING OPTIONS STATEMENT

The Provincial Policy Statement indicates the requirements for servicing new developable areas. Specifically sections 1.6.4.2 to 1.6.4.4.

Within these sections of the Provincial Policy statement it identifies the preferred methods of servicing new developments.

The preferred option would be to service the proposed lands by Municipal Services in the form of Stormwater, Sanitary Sewers and Watermains.

As the property in question is not in close proximity to the existing municipal services within the City of Ottawa, it is not feasible to extend municipal servicing to service the proposed development.

A communal well and communal wastewater system is identified within the Provincial Policy Statement as an alternative to municipal servicing. Communal water and sewage systems are shared between the individual land owners and will not be connected to the municipal sewage system. However due to the land area of the proposed lots and the relatively flat site a communal system would not be feasible or achievable for the wastewater. A communal well system may be developed, but again due to the land area and size of the proposed lots, this option may not be feasible.

Individual on-site sewage and water services may be used for new development in the form of wells and septic tanks with beds. The Hydrogeological and Terrain Analysis of the proposed development will identify requirements for location and spacing of the proposed well and septic.

Please refer to the Terrain Analysis and Hydrogeological Study Report No.Ph1236-1, Phase 1 Environmental Site Assessment, Report No.PH1236-2, Preliminary Geotechnical Investigation, Report No.PH1236-3 prepared by Paterson Group for information on the following items.

- Suitability of Terrain for proposed development.
- Soils types within the proposed development
- Available Groundwater Supply

4.0 CONCLUSIONS

Municipal servicing would not the preferred method of servicing for the proposed development as existing municipal services are not within close proximity and it would not be feasible to extend existing services to the proposed development. Communal systems for water and wastewater also may not be a feasible alternative as a result of the lots sizes and the flat terrain of the land. Private Services to individual lots would be the preferred method of wastewater and water servicing which would have minimal impact on the adjacent properties. The Terrain Analysis and Hydrogeological Study Report # Ph1236-REP.01 prepared by Pateron Group will form the basis on recommendations for the private servicing.

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