DILLON CONSULTING

Forever Homes Inc.

Conceptual SWM Report

168 Meadowlily Road South

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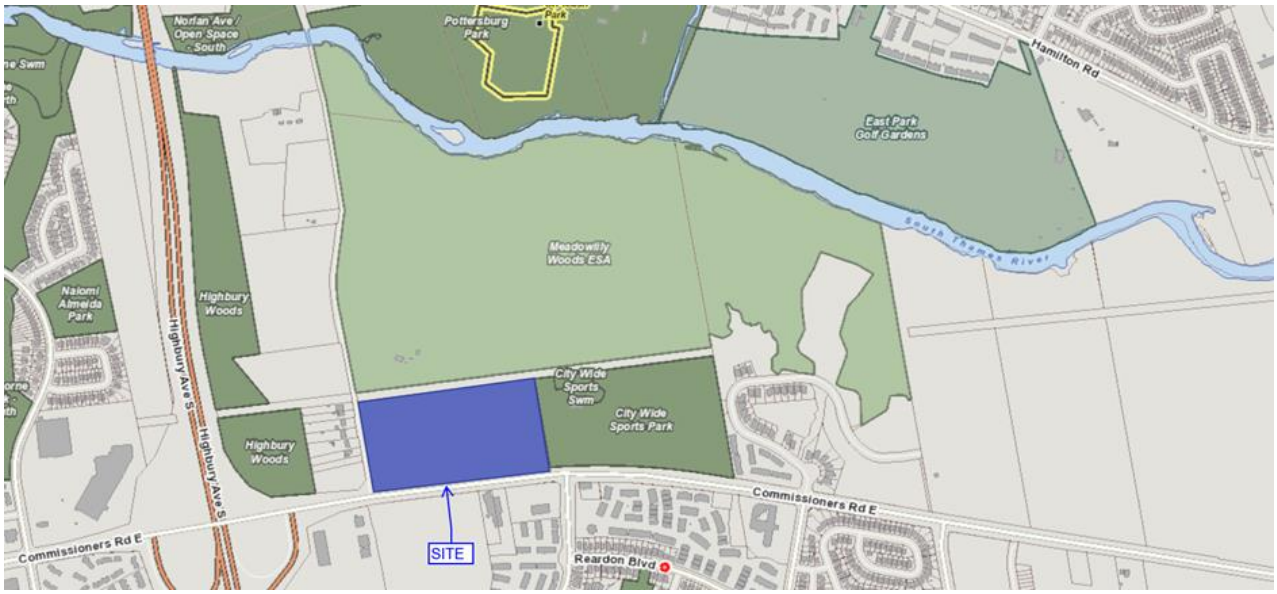
1.0 Introduction

Dillon Consulting Limited ("Dillon") was retained by Forever Homes Inc. (the "Client") to develop the proposed stormwater management (SWM) strategy to support the Draft Plan application for the subject site shown in **Figure 1**. The proposed residential development includes both medium-density and high-density blocks, and parkland.

Figure 1: Site Location



The site is located in the South Thames Subwatershed. This report documents the proposed stormwater management control requirements, and the proposed strategy for addressing them.

1.1 Background Information

The background information used to characterize the site and develop the proposed SWM strategy includes:

- City as-builts 29054 to 29060;
- Site Geotechnical Report (EXP, 2022);
- Interim Hydrogeological Assessment (EXP, 2022); and
- Water balance Letter (EXP, 2022).

1.2 Stormwater Design Criteria

The following stormwater management design criteria were developed for the subject site based on the guidance presented in the City of London Design Specifications and Requirements Manual (DSRM).

1.2.1 Quantity Control

The post-development peak discharges shall be controlled to pre-development magnitudes for all storms up to and including the 100-year design event. Major flows from all design events up to and including the 250-year storm shall be safely conveyed to an appropriate outlet.

1.2.2 Quality Control

Based on the guidance presented in the City of London's DSRM, runoff from all proposed developments located in the South Thames Subwatershed shall receive water quality treatment to achieve 70% long-term average total suspended solids (TSS) removal.

2.0 Existing Conditions

The site is an 8.3-hectare (ha) property and is primarily undeveloped agricultural land bounded by the Meadowlily Woods Environmentally Significant Area (ESA) to the north, Meadowlily Road South to the west, Commissioners Road East to the south, and City Wide Sports Park to the east. The site topography generally slopes northward towards the ESA.

2.1 Existing Drainage

As shown on **Figure 2**, most of the site runoff travels northerly towards the Meadowlily ESA as shallow surface flow. Existing surface drainage features convey the site stormwater northward through the ESA to the Thames River. Approximately 0.17 ha of the site drains eastward towards the City-Wide Sports Park.

2.1 Soils and Groundwater

Based on the information presented in the site Geotechnical Investigation Report (EXP, 2022), the subject property is comprised mainly of clayey silt till. Based on the soil grain size analyses and hydraulic properties reported in the document, the site soils are anticipated to have low permeability.

Monitoring well information from the Fall of 2022 presented in the site Hydrogeological Report (EXP, 2022) suggests that groundwater elevations on the subject site are more than 5 metres (m) below the local ground surface.

2.2 Existing Conditions Peak Flows

Hydrologic calculations were completed using Visual OTTHYMO 6 to estimate pre-development peak flows from the site. The hydrologic model was developed based on guidance from the City's Design Specifications and Requirements Manual (2024). The hydrologic model inputs and corresponding output summary are presented in **Appendix A**.

Table 1: Existing Condition Calculated Peak Flows (litres per second [L/s])

Design Event	Catchment EX01	Catchment EX02	Total Flow to Meadowlily ESA	Catchment EX03
25 mm	40	10	50	1
2-year	197	53	250	11
5-year	206	56	262	11
10-year	292	79	371	16
25-year	405	111	516	23
50-year	495	135	630	28
100-year	590	161	751	33
250-year	745	205	950	43

3.0 Proposed Conditions

The proposed development concept includes two high density residential blocks, two medium density blocks, a park block, and the local right-of-way (Street A). In accordance with the requirements of the DSRM, all proposed medium density and high-density residential blocks must provide on-site permanent private SWM (PPS) controls. The developable area of the site is generally located outside of a Significant Groundwater Recharge Area (SGRA).

3.1 Proposed SWM Strategy

As shown on the proposed conditions drainage area plan presented in **Figure 3**, runoff from approximately 6.45 ha of the site is collected and conveyed to the existing Meadowlily Road storm sewer. Runoff from both the proposed medium and high density residential blocks is provided by PPSs that provide all necessary water quality and quantity control to the runoff from each block. Runoff from the proposed Street A right-of-way is controlled by low impact development (LID) measures.

Due to grading constraints, runoff from approximately 1.44 ha of parkland along the northern site boundary travels as shallow surface flow to the Meadowlily Woods ESA. Since this area is mostly landscaped, no water quality or quantity controls are proposed to treat the runoff from this catchment.

Catchment PR06 includes the limits of the future widening of Commissioners Road East. Runoff from this approximately 0.41 ha area travels as shallow surface flow to the Commissioners Road corridor. Since this area is comprised of boulevard and is located within the future road right-of-way, no stormwater measures are proposed to treat the runoff from this catchment.

The proposed SWM strategy manages the stormwater for all design events up to and including the 250-year storm in accordance with City requirements.

3.2 Meadowlily Road Storm Sewer

The existing Meadowlily Road storm sewer is the primary stormwater outlet for the proposed development. The sewer conveys stormwater northward along the Meadowlily Road to the Thames River.

As shown on City of London as-built drawing 29054 presented in **Appendix B**, the existing storm sewer is designed to accommodate runoff from the western portion of the subject site. Hydrologic calculations were completed based on the storm sewer design information to establish the maximum allowable discharge from the proposed development to the existing storm sewer. Based on the calculation results presented in **Appendix B**, the existing storm sewer is designed to accommodate approximately 0.14 cubic metres per second (m^3/s) from the subject site.

As shown on the as-built storm sewer profile presented in **Appendix B**, the upstream invert elevation of the existing Meadowlily Road storm sewer is relatively shallow. The upstream portion of the existing storm sewer will likely need to be lowered to provide adequate pipe cover in the proposed 168 Meadowlily Road development. The limits of the existing storm sewer modification will be established during detailed design.

3.3 Minor System

A proposed storm sewer in Street A collects and convey all minor flows to the existing Meadowlily storm sewer. The proposed storm sewer includes a restrictor at the outlet to the existing Meadowlily Road storm sewer to attenuate the peak discharges from all design events up to and including the 100-year storm to 0.14 m^3/s. The proposed storm sewer alignment is shown on **Figure 3**.

3.4 Major System

The proposed PPSs and Street A SWM controls will accommodate flows up to and including the 100-year. Runoff from design storms great than 100-year event and up to and including the 250-year storm event must be safely conveyed by the major system. During detailed design, the proposed Street A right-of-way will be designed as an overland flow route to convey major flows to Meadowlily Road South. The proposed design will limit the maximum ponding depths on Street A to 300 millimetres (mm). **Figure 3** shows the proposed overland flow route alignment.

3.5 Proposed Conditions Hydrologic Analysis

A hydraulic/hydrologic assessment of the proposed conditions was completed using Visual OTTHYMO 6. Detailed modelling inputs and results are included in **Appendix A**.

3.5.1 Quantity Control

Water quality control is provided by the proposed PPSs and by underground storage located in the proposed Street A right-of-way. Maximum allowable design release rates were calculated for each PPS system by prorating the available Meadowlily storm sewer capacity by the areas of the proposed blocks. The storage volumes required to accommodate the 100-year runoff from each block were calculated using Visual OTTHYMO. The corresponding allowable release rates and preliminary design storage volumes are summarised in **Table 2**.

Table 2: Preliminary Design Storage Volume Summary

Catchment Identification	Allowable Release Rate (L/s)	100-year Required Storage Volume (cubic metre [m^3])
PR01	29	560
PR02	18	340
PR03	23	430
PR04	56	1100
PR05	142	240

The required storage volumes will be confirmed at the subdivision and site plan design stages once the proposed Street A storm sewer elevations are finalized. The required storage volumes will likely be provided by underground storage chambers in the PPSs. The required storage volume for PR05 is provided by underground storage galleries located in the proposed Street A boulevards.

Hydrologic calculations were completed using Visual OTTHYMO to estimate the proposed condition peak flows from the proposed development. A summary of the calculated peak flows is presented in the following table, and the supporting modelling documentation is provided in **Appendix C**.

Table 3: Proposed Condition Calculated Peak Flows (L/s)

Design Event	Total Flow to Meadowlily Storm Sewer	Total Flow to Meadowlily ESA	Total Flow to Commissioners Road
25 mm	80	8	3
2-year	142	60	29
5-year	142	63	30
10-year	142	88	41
25-year	142	122	56
50-year	142	150	68
100-year	142	179	80
250-year	142	230	102

The calculation results show that the proposed SWM strategy provides sufficient storage to attenuate the peak flows conveyed to Meadowlily storm sewer to the design discharge rate. Furthermore, the post-development peak flows conveyed to the Meadowlily ESA are lower than the corresponding pre-development values. The peak flows conveyed to the Commissioners Road right-of-way are relatively small and will be accommodated by the existing minor and major systems.

3.5.2 Quality Control

Water quality control is provided by the proposed PPSs and by bioswales located in the proposed Street A right-of-way.

At the site plan design stage, the proposed PPSs will be designed to provide water quality treatment to achieve 70% long-term average TSS removal for each residential block.

The proposed bioswales are designed to capture the 25 mm design rainfall event runoff from the proposed Street A right-of-way. The bioswales are located in the proposed Street A boulevards. Runoff from the proposed right-of-way is first directed to the bioswales where it is captured and infiltrated. A subdrain conveys the treated stormwater to the Street A storm sewer.

A preliminary design concept for the proposed bioswales was developed based on the guidance presented in the DSRM and is shown on **Figure 4**. The proposed bioswales incorporate the following design elements:

- Turf surface to facilitate maintenance;
- Maximum 3 to 1 ratio side slopes to allow grass mowing;
- Total design surface storage volume of approximately 70 m^3;
- Total design underground storage volume of approximately 270 m^3;
- Total design length of 500 m.

The preliminary hydrologic calculations presented in **Appendix C** were completed to verify that the proposed bioswales can be accommodated in the proposed Draft Plan and that they provide sufficient storage volume to accommodate the runoff from the 25 mm design rainfall event. A comparison on the calculated requirements and the proposed design values is summarized in the following table.

Table 4: Bioswale Design Summary

Design Parameter	Required	Provided
Surface storage volume required to capture the 25 mm design event runoff (m^3)	40	70
Total boulevard length required to accommodate the proposed bioswale design (m)	500	700
Total underground storage volume required to accommodate the 100-year site runoff (m^3)	240	270

Since the proposed bioswales capture and filter the runoff from the 25 mm design event, the proposed design meets the water quality treatment objectives.

3.5.3 Water Balance

A water balance assessment was completed by EXP in 2022 and is presented in **Appendix D**. The calculation results suggest that the proposed development will reduce the annual infiltration volume on the subject site by approximately 9,600 m^3 per year. Infiltration targets to mitigate the reduction in annual infiltration rate will be developed at the subdivision design stage.

4.0 Conclusions and Recommendations

The proposed development consists of residential and mixed-use blocks. A conceptual SWM strategy has been prepared to control the runoff from the proposed development in accordance with the City's requirements and includes:

- Permanent private onsite stormwater systems to treat the runoff from each medium and high-density residential block; and
- Bioswales and underground storage to treat the runoff from Street A.

The proposed SWM strategy meets the site stormwater management design criteria.

The following items will be addressed in further detail as the design process proceeds:

- The PPS requirements will be confirmed at the subdivision design stage and detailed design of the PPSs will be completed at the site plan stage;
- Detailed design of the proposed bioswales and underground storage located in Street A will be completed at the subdivision design stage; and
- Required improvements to the Meadowlily storm sewer will be identified at the subdivision design stage.