

Memo



To: Corporation of the City of Windsor
From: Laura Herlehy, P.Eng., Project Engineer
Kailee Dickson, EIT, Project Engineer
Date: August 31, 2023
Subject: City of Windsor Surplus Airport Lands Stormwater Management Servicing Strategy
Our File: 23-5796

1. Introduction

Dillon Consulting Limited (Dillon) was retained by the City of Windsor (City) to develop the Surplus Airport Lands Functional Servicing Study (August 2023) for the development lands located at 3200 County Road 42, in the City of Windsor. To supplement that document, this memo expands on the stormwater management servicing strategy and more specifically, the pond functional design requirements of the proposed downstream stormwater management facility (SWMF) Pond P8, which the stormwater system will outlet to. The functional design for this SWMF was included in the Sandwich South Master Servicing Plan (SSMSP) (May 2023).

The proposed development area is broken into two phases. Phase 1 is approximately 109.3 ha and is currently in operation as agricultural lands. When fully developed, the land uses will consist of 26.96 ha of business park, 74.29ha of industrial land use and 8.05 ha of roadway. Future Phase 2 is located north of Phase 1 and is approximately 69.79 ha. This area was not assessed to Pond P8 in the SSMSP and the proposed sewer and outlet for this development has not been sized to convey these flows. Future Phase 2 will require separate SWMF which will discharge into the existing municipal drains, McGill Drain and Lappan Drain, northeast of the site, and further downstream to the Little River Drain.

The following documents and drawings were referenced when completing this memo:

City of Windsor – Sandwich South Master Servicing Plan, Municipal Functional Design Report (May 2023);
City of Windsor – Sandwich South Master Servicing Plan, Stormwater Management Technical Report (May 2023); and

2. Background

The SSMSPP includes a Stormwater Management (SWM) Technical Report (May 2023) which provides an outline of the appropriate stormwater conveyance and management within the SSMSPP area. This includes proposed stormwater management facilities (SWMFs) based on pre-determined drainage areas for future developments. The proposed development area is allocated to Pond P8 within the SSMSPP SWM Technical Report.

Pond P8 is proposed to have three (3) inlets: County Road 42 (CR42), Windsor Airport and Lauzon Parkway. The required sizing and capacity of Pond P8 was modelled using a total drainage area of 179.1 ha. It was assumed that the developments will consist of an initial build out of 117.8 ha with an additional 61.3 ha for ultimate buildout, and inlet flow rates based on a 1:10 year trunk sewer designed. The initial build out area consists of proposed road ways including Lauzon Parkway, and CR42 and lands fronting the south side of CR42. The ultimate build-out area includes the developable Windsor Airport lands. Subsequent to the completion of the SSMSPP, the need to accommodate SWM servicing for the Windsor Airport lands is determined to be more immediate, therefore the full construction of the P8 SWMF is warranted. The pre-determined drainage areas and expected inflow rates for the three (3) inlets are shown in **Table 1** below.

Table 1: Pond P8 Inlets

Inlet into Pond P8	Ultimate Buildout Drainage Area (ha)	Trunk Sewer 10-year Inflow Rate to Pond P8 (L/s)
Outlet 1 – CR 42	91.2	10,450
Outlet 2 – Airport	83.0	13,330
Outlet 3 – Lauzon Parkway	4.2	770
Total Residential	179.1	24,550

Pond P8 will be constructed as a twin-cell pond system with a gravity connection and will be located directly north of CR42 and west of Little River Drain within the City of Windsor owned lands. This pond will have a regional pumping station pond outlet into the Little River Drain.

3. Proposed Stormwater Management Facility

i. Quantity Control

The proposed development lands are currently undeveloped lands and are assessed to the existing drain (former Rivard Drain), which is an open Municipal Drain, located within the development lands. The drain flows east into Little River Drain and is then conveyed into the Detroit River. Phase 1 has a total drainage area of 109.3 ha and will consist of 26.96 ha of business park, 74.29 ha of industrial land use and 8.05 ha of roadway.

The proposed storm sewer network will outlet into Pond P8, east of the proposed development, at “Outlet 2 – Airport” as identified in the SSMSW SWM Technical Report. A total of 13,290 L/s inflow rate is expected to outlet into Pond P8 from the proposed development based on a 1:10 year storm event as determined in the Surplus Airport Lands Functional Servicing Study (August 2023). This is within the expected 13,330 L/s inflow rate at the “Outlet 2 – Airport”. However, the proposed drainage area of 109.3 ha is 32% more than the allocated drainage area of 83.0 ha. It should be noted that based on the detailed design, the need to increase the storage volume to accommodate this change in drainage area shall be evaluated.

Table 2 below provides the minimum required storage volumes and water elevations determined through the SSMSW for reference. The pond shall be designed to provide storage for minor system conveyance (storm sewer inflow) and major system conveyance (overland flow). The development overland flow route shall be directed to the pond and if required, a spill way shall be provided to ensure overland flow can enter the pond.

Table 2: Pond P8 Summary of Critical Water Levels

	Water Level Evaluation (m asl*)	Required Storage Volume (m3)	Functional Design Provided Storage Volume (m3)
Pond Bottom	176.00	-	-
Normal Water Level (NWL)	178.00	27,700 (Permanent Pool)	32,000 (Permanent PoAol)
1:100 Year Water Level	181.47	141,200 (Active Storage)	190,404 (Active Storage)
Top of Bank	183.00 (Average Existing Grade)	190,404 (Active Storage for Climate Change Event)	247,300 (Active Storage)

* m asl = meters above date sea level.

The functional design of the Pond P8 was established to achieve an unsubmerged storm sewer inlets. The NWL was set at the invert of the lowest sewer inlet. In this instance, the size of the pond therefore provides more than the minimum required storage volume. Should the inflow from the Airport Developable lands increase by approximately 32% (assuming it is similar to the increase in area) than the increased storage volume may still be maintained within the functional design footprint require marginal increase.

ii. Quality Control

Pond P8 shall be a wet pond that incorporates a maximum of 2.0 m deep permanent pool that must meet the Ministry of Environment, Conservation and Parks (MECP) requirements for normal level of Total Suspended Solid (TSS) removal. An in-line sediment forebay must also be provided at the pond inlets to accommodate first flush TSS removal.

iii. Outlet

Pond P8 will have a regional pumping station pond outlet into the Little River Drain. The pumping station is required to have a capacity of 1.258 m³/s with 2 duty pumps and 1 standby pump including a standby power generator as designed in the SSMSP Functional Servicing Report (FSR) (May 2023). The pumping station capacity and the total outflow to the Little River must remain unchanged. Pumping station configuration may be staged based on the phased implementation of the pond storage capacity.

The pumping station shall be designed to provide opportunity for the City to fully drain the pond as part of the future maintenance of the SWM facilities. A lower invert maintenance outlet from the pond to the pumping station is recommended, in addition, a subdrain at the downstream end of the pond to the pumping station wet well including provisions to override the pump-on elevations when maintenance is required. More details regarding the Pond P8 pumping station can be found in the SSMSP FSR (May 2023).

iv. Other Design Elements

As noted above, this pond is proposed to be a wet pond that will have a permanent pool which will serve to provide stormwater quality control. Due to the proximity to the active Windsor Airport, the need to implement measures to mitigate waterfowl habitat is required. Details on design parameters including geometric design, landscaping, fencing and other features can be referenced in the Supplementary

Waterfowl Adaptive Mitigation Plan for Stormwater Management Facilities, SSMS (May 2023). The pond design shall be reviewed in conjunction with the Airport to confirm that the design meets the requirements of the Adaptation Plan. As the pond is constructed and during operation, monitoring and maintenance of the pond is imperative ensure mitigation measures are effective over the lifetime of the facility. The pond area shall also include provisions for recreational pathways and maintenance corridor.

4. Conclusion

It is recommended that the sizing and allowable capacity of Pond P8 be confirmed including the completion of a detailed dual drainage model analysis to determine the minor and major event inflow volumes in order to accommodate the additional drainage area from the proposed development. Based on the footprint and geometry of Pond P8 is concluded that the proposed drainage area modifications would not require an increased in the total SWMF land use corridor.

Yours sincerely,
DILLON CONSULTING LIMITED



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