

re: LID Feasibility Review
Proposed Residential Development
Eagleson Road at Ottawa Street - Ottawa
to: Tamarack (Richmond) Corporation - **Mike Green** – mike.green@taggart.ca
cc: DSEL – **Braden Kaminski** – bkaminski@DSEL.ca
date: March 14, 2025
file: PH5013-MEMO.01 Revision 1

Further to your request, Paterson Group (Paterson) has prepared the current memorandum report to review the feasibility of Low Impact Development (LID) measures for the aforementioned site. Paterson's review is based on theoretical infiltration rates and measured groundwater levels at the time of the field investigations. The memo should be read in conjunction with Paterson Report PG4216-1 Revision 4, dated March 14, 2024.

1.0 Background Information

Based on our correspondence with DSEL Engineering, it is our understanding the proposed LID measures would incorporate a treatment train approach that includes an exfiltration system tied to the catch basins at select locations across the western and northeastern portion of the proposed development. It should be noted that the entire site was initially considered for infiltration-type LID measures. However, due to the presence of silty clay within the eastern portion of the proposed development, LIDs are not deemed suitable for this portion of the site per Technical Bulletin IWSTB-2024-04.

IWSTB-2024-04 came into effect in late 2024 as part of the City of Ottawa Sewer Design Guidelines and is discussed below. It is considered to supersede the previous City of Ottawa Low Impact Development Technical Guidance Report (LIDTGR) completed by Dillon Consulting and Aquafor Beech Limited for infiltration-type LIDs for greenfield sites.

2.0 Field Observations

Generally, the subsurface profile encountered within the western portion of the subject site consists of topsoil underlain by a loose to dense silty sand to sandy silt and/or compact to dense glacial till deposit. The eastern portion of the subject site consists of topsoil underlain by very stiff to firm silty clay followed by a compact to dense glacial till deposit. The glacial till has been noted to be comprised of silty sand and/or silty clay matrix with varying amounts of gravel, cobbles and boulders was encountered below the above noted layers. Practical refusal to drill and excavation was encountered at multiple locations throughout the subject site.



Based on available geological mapping and field observations, bedrock in the area consists of dolostone of the Oxford formation with a drift thickness of 1 to 10 m bgs.

As noted above, the eastern portion of the subject site is generally comprised of silty clay and not considered suitable for infiltration-type LIDs per IWSB-2024-04. As such, this area has not been included in Paterson's LID feasibility review discussed below.

The surficial geological material encountered below the topsoil stratum can be shown within Paterson Drawing PH5013-1 – Pre-Development Terrain Composition Plan. The material is considered to be the stratum encountered below the topsoil layer and does not consider the overall thickness of that layer.

Groundwater

Groundwater levels measured from piezometers at the borehole locations within the potential LID areas during the field investigation have been summarized in Table 1 below. It should be noted that groundwater levels can fluctuate both seasonally and in conjunction with precipitation events. As such, water levels may vary at the time of construction.

Table 1 – Summary of Groundwater Levels				
Test Hole	Surface Elev. (m)	Measured Groundwater Level		Date Recorded
		Depth (m)	Elevation (m)	
BH1	93.96	0.61	93.35	December 28, 2018
BH4	97.71	1.10	96.61	December 28, 2018
BH5	97.45	n/a	n/a	n/a
BH6	94.70	0.73	93.97	December 28, 2018
BH7	94.88	0.83	94.05	December 28, 2018

3.0 Subsoil Infiltration Values

It is understood the approximate target infiltration elevation for the proposed LID infiltration system will be within the silty sand, glacial till, and/or fill material at select locations. Based upon previous experience at similar sites in the area with similar stratigraphy and typical published values, hydraulic conductivity values and infiltration rates for the subsoils have been estimated and summarized in Table 2 below.

Based on the continuity and infiltration potential of the subsurface material at the proposed LID locations, a safety correction factor of 2.5 to 3.5 should be applied to the estimated infiltration rates. Refer to the *2010 Low Impact Development Stormwater Management Planning and Design Guide prepared by the CVC and the TRCA* for safety correction factors.



While the native material within the proposed LID areas is generally considered acceptable for infiltration, site-specific testing is recommended to be completed at the invert depths of the system should infiltration-type LIDs be proposed.

Table 2 – Estimated Hydraulic Conductivity and Infiltration Rates		
Soil Type	K (m/sec)	Infiltration Rate (mm/hr)
Silty Sand	1×10^{-6} to 1×10^{-4}	45 to 160
Glacial Till (silty sand matrix)	1×10^{-7} to 1×10^{-6}	25 to 45
Fill Material (Silty clay to silty sand)*	1×10^{-10} to 1×10^{-4}	5 to 160
<i>*As per the screening criteria noted in Technical Bulletin IWSTB-2024-04, infiltration-type LIDs will not be permitted within engineered fill.</i>		

4.0 Seasonal Groundwater

As noted above, groundwater levels were measured from piezometers at the borehole locations within the proposed LID areas during the field investigation. Manual groundwater levels were measured from 0.6 to 1.1 m below ground surface (ie: 93.4 to 96.6 m asl) on December 28, 2018, and generally follows local topography. It should be noted the above measured groundwater readings are expected to be the seasonally low groundwater levels given the timing of the measurements (December). To account for seasonal fluctuations during the spring freshet, **a preliminary seasonal high groundwater level of 0.5 m below ground surface can be considered for this LID feasibility review at this time.**

A groundwater monitoring program is currently ongoing within the proposed LID areas in order to confirm the seasonal high groundwater levels per IWSTB-2024-04.

While much of the eastern portion of the subject site is not being considered for infiltration-type LIDs due to the presence of silty clay, a groundwater monitoring program has been carried out in support of sump pumps. Based on the monitoring program, seasonal-high groundwater levels were noted to be at ground surface at several monitoring locations.

Given the shallow groundwater levels measured during the field investigations and expected seasonal fluctuations, the site is not expected to be generally conducive to infiltration-type LID practices.

5.0 City of Ottawa – LID Guidance / Technical Bulletin

The City of Ottawa has previously referenced the Low Impact Development Technical Guidance Report (LIDTGR) completed by Dillon Consulting and Aquafor Beech Limited. It should be noted that this is only a document to provide general guidance and is not considered as a Guideline. As the LIDTGR is only a guidance document, the following Bulletin is considered to supersede the information provided in the LIDTGR as there are conflicting directives.



The City Technical Bulletin – IWTSB – 2024-04 came into effect September 12, 2024, as part of the City of Ottawa Sewer Design Guidelines. Specific constraints have been provided by the City that would negatively impact the ability of the site to be approved for LIDs based on the current version of the Bulletin or restrict the benefits of using LIDs.

The following are some of the applicable excerpts from the Bulletin:

- ❑ Changes to planned infrastructure in an approved SWS, EMP, or MSS that involve elimination or downsizing of end-of-pipe facilities in favour of LIDs are not permitted.
- ❑ Due to the poor hydraulic properties of silts and clay, infiltration-type LID practices are not permitted in clay or silt soils, nor in soils that warrant a dual classification with silt or clay as per the Unified Soil Classification System.
- ❑ The invert of infiltration-type LID practices must normally be at least one metre above the seasonally high (pre-development) groundwater elevation, based on testing and documentation requirements specified below. If there is less than one metre separation to the seasonally high groundwater elevation, extended monitoring programs and thorough hydrogeological assessments will be required, including groundwater mounding analyses.
- ❑ The monitoring wells shall be equipped with data loggers, which should be installed for a long enough period of time to assess seasonal fluctuations. A minimum of one year of data is required.

The current form of the Bulletin notes that soils that have components of silt or clay should not have infiltration-type LID practices. This covers the majority of soil types and limits potential LID locations. It is recommended that the Bulletin be reviewed by the stormwater management design team to ensure additional criteria are appropriately assessed.

6.0 Conclusions

Based on the IWSTB-2024-04, the site may have difficulty meeting the criteria outlined by the City due to the soil gradation and observed groundwater measurements despite the limited data on the western portion.

Based on our review of the limited groundwater data within the western and northeastern portions of the subject site, the shallow groundwater levels measured during the field investigation is not generally conducive to infiltration-type LID practices that are being proposed.

The abovenoted conclusions will be updated upon completing the groundwater monitoring requirements per IWSTB-2024-04.



We trust that the current submission meets your immediate requirements.

Best Regards,

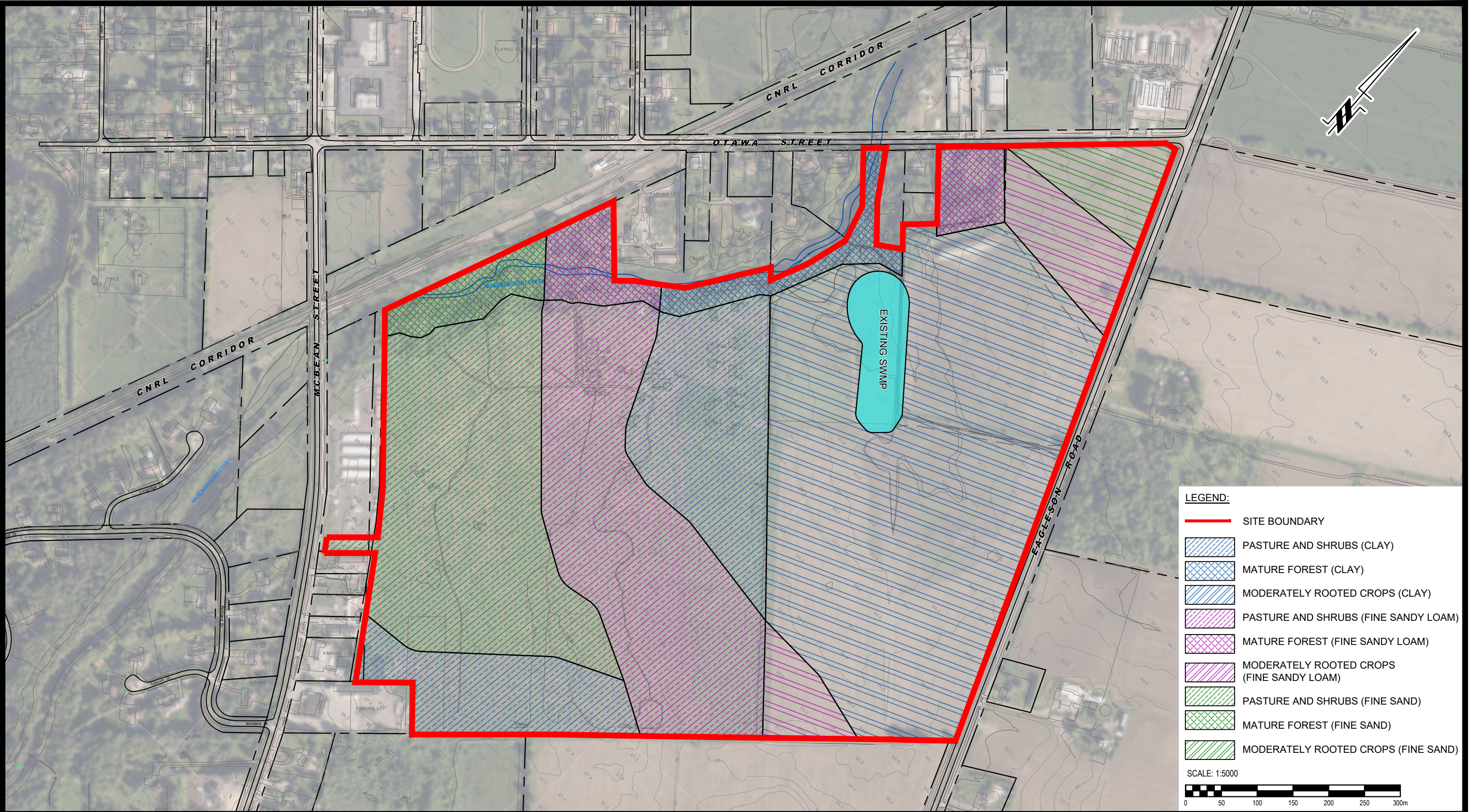
Paterson Group Inc.

Nicholas Zulinski, P.Geo., géo.



Michael Killam, P.Eng.





LEGEND:

- SITE BOUNDARY
- PASTURE AND SHRUBS (CLAY)
- MATURE FOREST (CLAY)
- MODERATELY ROOTED CROPS (CLAY)
- PASTURE AND SHRUBS (FINE SANDY LOAM)
- MATURE FOREST (FINE SANDY LOAM)
- MODERATELY ROOTED CROPS (FINE SANDY LOAM)
- PASTURE AND SHRUBS (FINE SAND)
- MATURE FOREST (FINE SAND)
- MODERATELY ROOTED CROPS (FINE SAND)

SCALE: 1:5000

<div><div><div>PATERSON GROUP</div><div>9 AURIGA DRIVE OTTAWA, ON K2E 7T9 TEL: (613) 226-7381</div></div></div>					TAGGART INVESTMENTS WATER BUDGET ASSESSMENT PROPOSED MIXED-USE DEVELOPMENT 5970 AND 6038 OTTAWA STREET	Scale: 1:5000 Date: 03/2025		
							OTTAWA, Title: PRE-DEVELOPMENT TERRAIN COMPOSITION PLAN	Drawn by: GK Report No.: PH5013-1
	NO.	REVISIONS	DATE	INITIAL		Checked by: NZ Approved by: NZ	Dwg. No.: PH5013-1 Revision No.:	