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MEMORANDUM

To: **Mr. Mustafa Ghassan, Delta Urban Inc.**
% Mr. Tim Gallagher, M.Sc., P.Eng., P.E. – Senior Principal (tim.gallagher@stantec.com)
Stantec Consulting Ltd.

Date: November 14, 2024
File No.: 24255

Subject: Elfrida Subwatershed Study Review: Karst Considerations
Elfrida Urban Boundary Expansion, Elfrida Community Subwatershed, Hamilton, Ontario

Further to your emailed request and subsequent correspondence, Landtek Limited (herein "*Landtek*") provides this memorandum pertaining to the review of an existing subwatershed study report completed for the Elfrida Subwatershed Study Area (herein "*ESSA*"). Specifically, comment is required regarding the assessment within the report, of potential karstic conditions within the ESSA.

The Corporation of the City of Hamilton (herein "*City of Hamilton*") endorsed the Growth-Related Integrated Development Strategy in 2006, that identified preferred areas for future growth, of which the ESSA is one. Aquafor Beech Limited (herein "*Aquafor Beech*") was subsequently commissioned to undertake a Phase 1 Subwatershed Study (herein "*SWS*") to support the development of an 'Elfrida Growth Area Secondary Plan', the findings of which are presented in the following report:

- Aquafor Beech, "*Elfrida Subwatershed Study, Final Phase 1 Report*", reference 65726 and dated May 24, 2018.

The SWS report documents the study undertaken to investigate and inventories the natural resources that could potentially be impacted by future urban development. The report also identifies development limitations and opportunities associated with the proposed land use changes.

In developing the assessment of karstic conditions within the ESSA, Aquafor Beech undertook in-situ dye testing at known karstic locations and reviewed extensively, Conservation Authority- and City of Hamilton-held documentation, including following documents:

- "*Twenty Mile Creek Fluvial Geomorphology Study*" (Harrington and Hoyle Ltd., September 1999);
- "*Hamilton Groundwater Resources Characterization and Wellhead Protection Partnership Study*" (SNC-Lavalin, April 2006);
- "*Geologic Hazard Mapping Study, Karst Topography, Phase 1, NPCA Watershed Area*" (Terra-Dynamics Consulting Inc., April 2006); and,
- "*Updated Assessment Report – Niagara Peninsula Source Protection Area*" (NPCA, October 2013).

The study determined in detail, the "*key hazard lands*" (i.e. including karstic conditions) together with the associated development limitations and presented them in the report, Figure 4.2 "*Limitations and Opportunities to Development*". A copy of Figure 4.2 is attached, for reference.

Based on the extents of the assessment undertaken by Aquafor Beech, it can be considered that the Phase 1 Elfrida Subwatershed Study has been completed in accordance with the following:

- 2024 Provincial Policy Statement;
- Hamilton Conservation Authority (HCA) Planning & Regulations Policies and Guidelines; and,
- NPCA Policy and Documentation: Policies for Planning and Development in the Watersheds of the Niagara Peninsula Conservation Authority.

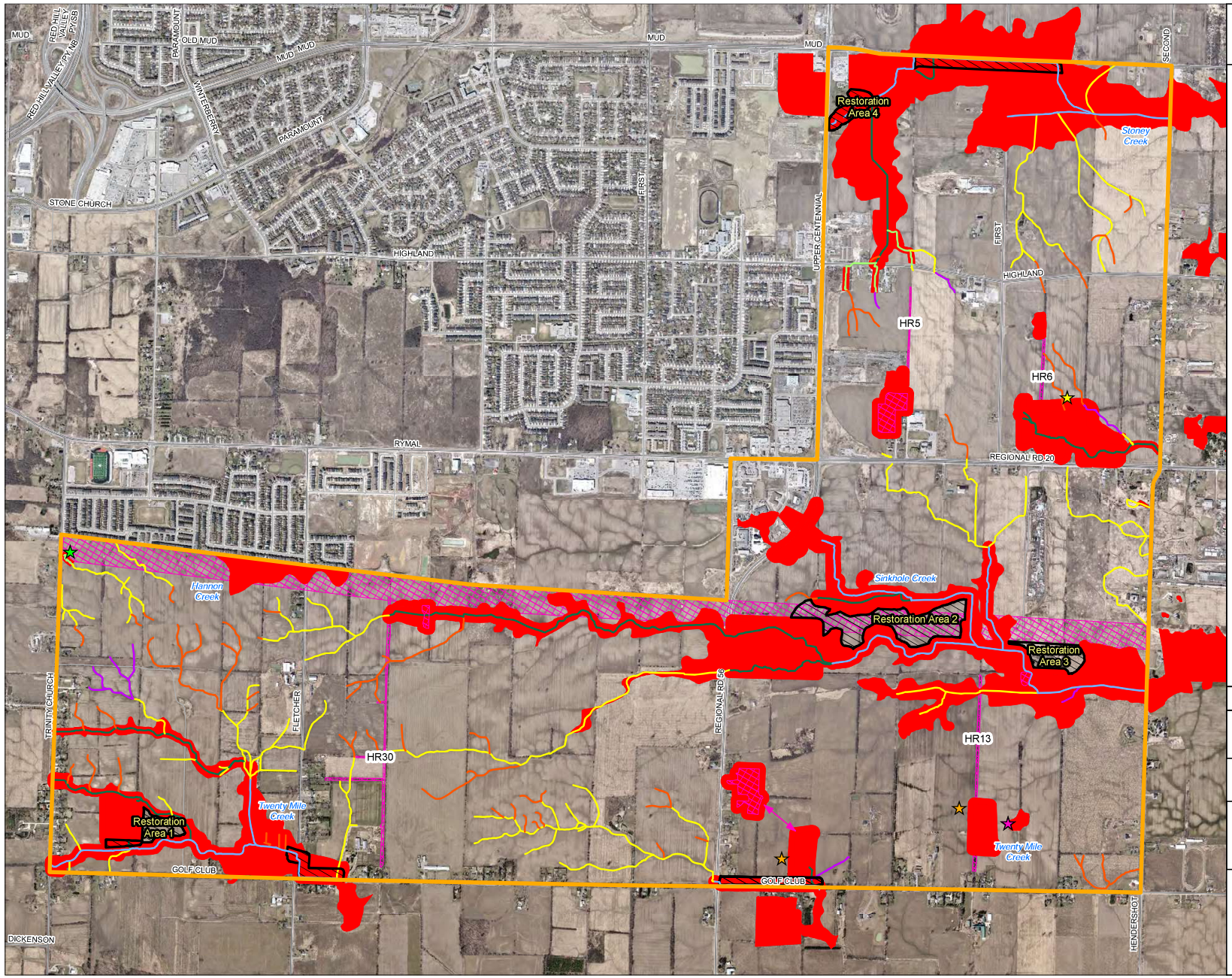
On this basis, it can be also considered that the karst limits outlined by the SWS report remain representative of existing karstic extents within the ESSA and that the background karst delineation is reasonable in supporting the Urban Boundary Expansion at this stage. It should be noted though, that the limits and extents defined by the SWS report may be subject to refinement, based on the findings of ongoing field investigations and assessment.

Kind regards,

LANDTEK LIMITED

James Dann, B.Eng. (Hons.), ACSM
Manager, Geotechnical Projects

Ralph Di Cienzo, P.Eng.
Consulting Engineer



Elfrida Subwatershed Study

Legend

- Study Area
- Limitation To Developement
- Restoration Areas
- Watercourse
- Karst Sinkhole

LINKAGES

- Linkages
- Linkage: Conceptual Location
- Potential Future Snake Corridor

HEADWATER DRAINAGE FEATURES

- Protection
- Conservation
- Mitigation
- No Managment Required
- No Access

MANAGEMENT CONSIDERATIONS

- Collect overland flow at point to maintain wetland hydrology
- Sheet flow, special considerations for vernal pools in wetland, and wildlife

Figure 4.2

Limitations and Opportunities to Development

Date: May 2018
Data Source: City of Hamilton 2016

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Kilometers

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Hamilton

Aquafor Beech Limited