



ENGINEERING
CONSULTANTS LTD

LETTER REPORT

January 5, 2022

Draft October 26, 2021

21-080

Municipality of Arran-Elderslie
1925 Bruce Road 10, Box 70
Chesley, ON N0G 1L0

Attn: Scott McLeod, Manager of Public Works

Re: Elgin Street Flooding, Tara

Dear Mr. McLeod

We are providing this letter report re: Elgin Street flooding issues as follows:

1) Background Information

Arran-Elderslie received document, dated August 6, 2021, issued jointly by 11 residents along Elgin Ave, Tara. The residents have complained about water damage resulting from recent heavy rainfall events, more notably of July 8, 2021 event. Complaints related to water damage, water ponding in ditches, and in their rear backyard. The letter narrated several issues, but they appear incoherent in nature. The residents appear to be alluding the damage to the new Chestnut Hill Subdivision that was built around 2018-2019 and is located on the north side of Brooke Street.

Subsequently GSS was hired to field inspect the area, undertake investigations and provide recommendation(s) to prevent the problem from recurring in the future.

2) Field Investigation Program

❖ Site Visit

Field investigation was completed in 3 steps. On August 31, 2021, Rakesh Sharma, and Matt Wilder of GSS Engineering Consultants Ltd. visited the site and were accompanied by Mr. Scott McLeod and Mr. Brian McDougall of Arran-Elderslie. During this visit, it was generally noted that backyards of houses on east side of Elgin St. are relatively flat. Two poorly built catchbasins with poorly constructed outlets were noted in the rear backyard. We talked to residents of 115 and 105 Elgin St. Resident of 105 Elgin St. complained about water in the basement. At the time of our visit, he talked about installing a sump-pump system to pump out foundation drain.

Resident of 115 Elgin St. did not have any issues as his house is built sufficiently above grade. He however informed about a deep storm (clay) sewer underneath the east side ditch, that staff was not aware of. He also informed about swamp land on east side of Elgin St and noted very wet conditions when he built his house.

During field inspection, we also noted driveway culverts partly filled in thereby preventing free flow of water in the ditch.

❖ CCTV Inspection

A CCTV inspection of clay sewer was arranged by municipal staff to assess the condition of 150 mm storm sewer and to determine which houses do have foundation drains attached to street sewer. A camera was launched from DICB located opposite to 89 Elgin St., but camera could not travel beyond ± 30 m due to collapsed sewer. Sewer was plugged preventing smooth flow in sewer from north to south, partly explaining some of the observations noted in complaint letter and complaint by resident of 105 Elgin Street.

❖ Topographic Survey

Lastly, a partial topographic survey of the site was completed to determine the area that is draining to the roadside ditch. Survey also focused on collecting information about existing catchbasin, driveway culverts, storm sewers, top of finished floor of the residences on east side of Elgin St. **Figure 1** indicates overall existing conditions.

3) Investigation Results

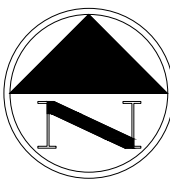
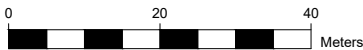
A review of the drainage pattern, storm sewers layout on Brooke St. and Chestnut Hill Subdivision confirm that the development of subdivision is not responsible for Elgin St. flooding issues. Chestnut Hill Subdivision's storm sewer system discharges into a Stormwater Management Pond which have outlets towards Brooke Street storm sewer on north side at a location east of Elgin St./Brooke St. intersection. Brooke St. storm sewer eventually drains into Yonge St. storm sewer. A small area on south side of Brooke St. does drain towards Elgin St. west side ditch, which appears to be the case before subdivision development.

The catchbasin in the backyard of 89 Elgin St. collects runoff from a very large area (0.93 ha) as indicated in **Figure 1**. Catchbasin has only 100 mm Big O outlet, which is undersized. 375 \varnothing pipe outlet at 0.75% slope is required as a minimum to handle a rainfall event of 110 mm/hour.

As noted earlier, 150 mm \varnothing storm sewer on east side of Elgin St. is collapsed and has blocked the water flow. It is likely that any foundation drains connected to this sewer north of the blockage location, were unable to properly drain water, leading to backup in the basements and/or footings, and possibly rising through granular backfill around basement walls.

A review of the old 1954 air photo prior to construction of homes along Elgin St. does not confirm the presence of wetlands or swamp land adjacent to Elgin Street. However, poor drainage characteristics of the soil could contribute to drainage issues on Elgin Street.

G:\SS Common\2021\21-080 Elgin St Flooding, Tara - Scott Wilson\Drawings\21-080.dwg Oct 26, 2021 3:06pm



CATCHMENT AREA 1 = 9,250m²
CATCHMENT AREA 2 = 3,450m²

— STORM DRAIN CONNECTION POINTS
LOCATED BY CCTV

EXISTING DRAINAGE CONDITIONS
ELGIN AVENUE, TARA
MUNICIPALITY OF ARRAN ELDERSLIE



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Design:	RS
Drawn:	MW
APPROVED:	RS
Date:	OCT 2021
Scale:	1:1000
FILE No.	21-080
FIG. No.	FIG. 1

It was also noted that Elgin Street road profile creates a valley-like situation, where runoff collects at the lowest point near house #78 and #84 and drains towards the west by way of a 200 mm storm sewer. This storm sewer is deep but located potentially too close to house foundation.

The following conclusions are drawn from investigations:

- ❖ Recent flooding issue along Elgin St. appear unrelated to Chestnut Hill Subdivision.
- ❖ Collapsed sewer on east side of Elgin St. appear to have foundation drains connected to it.
- ❖ Drainage through ditch is not ideal due to partially filled driveway culverts.
- ❖ Rear yard catchbasins and their outlets are improperly built.
- ❖ The storm sewer outlet on Elgin St. may be undersized but cannot be upgraded or replaced in future due to proximity of home foundation.

4) Future Upgrades

Based on the foregoing information it is obvious that existing storm water drainage system on Elgin Street requires upgrade to prevent flooding in future. Arran-Elderslie need to, however, determine what level of protection need to be provided. MECP Design Guidelines entitled “**Design Guidelines for Sewage Works 2008**” states:

“The storm frequency in the design of stormwater conveyance systems will vary depending upon the nature of the area being served, the value of the property being protected, and the consequences of more intense storms being experienced.

It is recommended that the major-minor drainage system approach be utilized for urban drainage for all future development. The minor drainage system (i.e., roof gutters, service connections, street gutters, catch basins and storm sewers) accommodates the runoff from more frequent storms up to the design frequency of the system (e.g. 2-year return design storm). Where weepers/foundation drains are connected to the storm sewers, they should also be designed to capture no more than the amount of runoff from design frequency storm in order to prevent surcharge conditions.

The major system (i.e., natural streams and valleys and the roads, swales, channels and ponds) accommodates runoff from less frequent design storms such as the 100-year return design storm or regional flood event.”

Guideline further states that “*It is recommended that as a minimum a 2-year return design storm should be used for design purposes.*” 2-year return design is the minimum that Arran-Elderslie should adopt. The current engineering practice, however, is to use a minimum 5-year return period due to change in the global weather pattern. Engineering Standard of various municipalities also have adopted 5-year return period for design of storm sewers.

The design guidelines referred to above indicate that storm sewers in general are designed for frequent storms (2-year to 5 year). During the low frequency storms (10-year to 100 year storms), the road surface along with the ditches can carry the storm runoff.

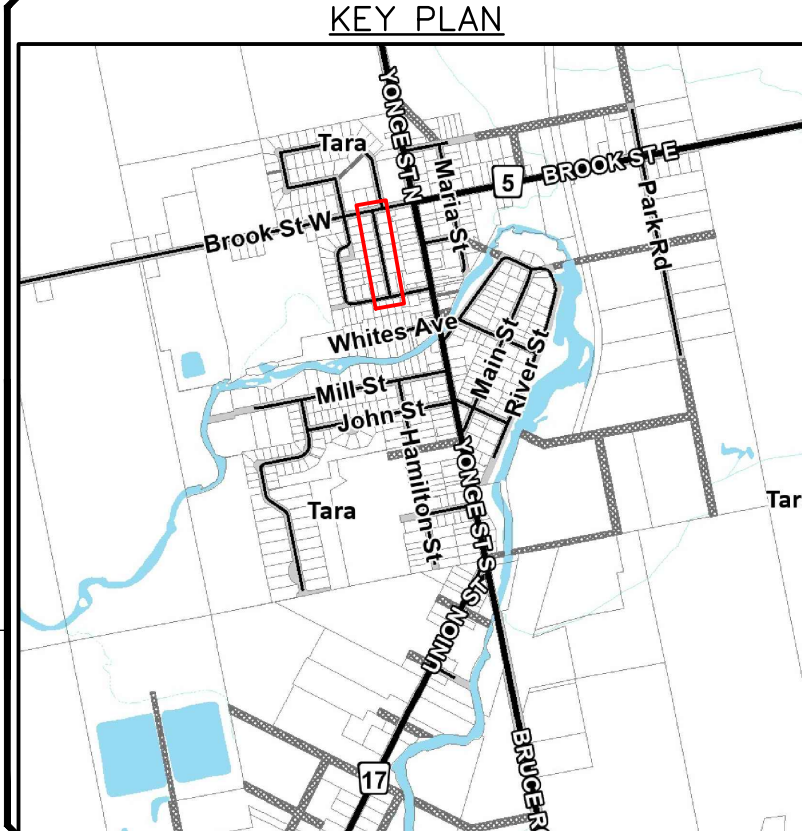
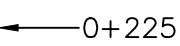
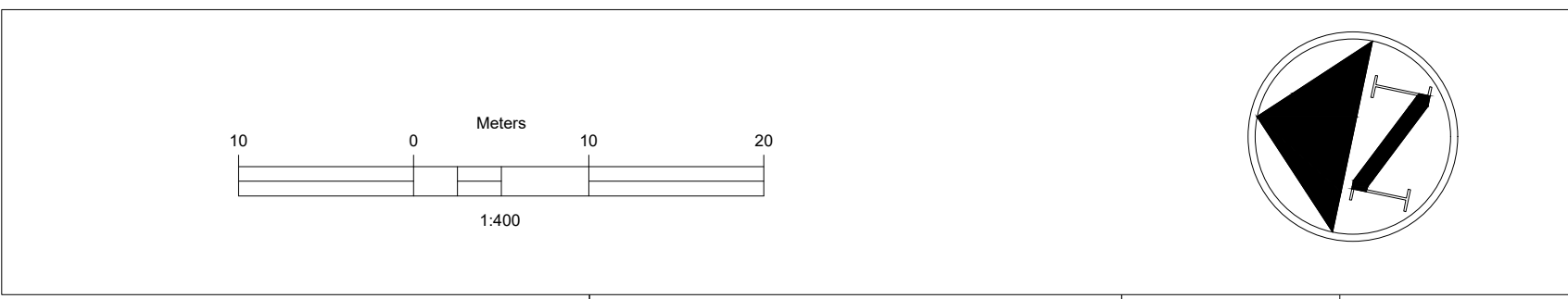
Typically, larger storms flood the street without flooding homes and carry runoff along road surface between curb & gutter (where available) to downstream area. However, this design basis is used carefully at planning stage and give consideration to the floor elevation of homes and prevent openings in basement walls below flood water level, etc. For information the design of all storm sewers in a town or city for 100 year storm, shall be very expensive and impractical.

The streets, therefore, can experience temporary flooding at the time of higher return periods. But it should occur in a manner that does not lead to serious property damage. As noted above, larger precipitation events runoff flow are normally routed through streets in the form of “sheet-flow” between curb & gutter. The depth and velocity of flow on road surface, however, is controlled to prevent erosion or other hazards.

In view of the above, we have indicated on the attached **Figure 2** the upgrades that are needed to prevent future flooding events. The design is based on the assumption that Arran-Elderslie shall be unable to procure easement for existing 200 ø storm sewer between houses and shall not be able to upgrade it. Therefore, entire storm water from Elgin Street must flow to the south and then to the west along Matilda Street. The existing 200 mm storm sewer shall be abandoned. The other highlights of the design concept include:

1. Improved ditching on East and West Side of Elgin Street: The ditch needs to be minimum 750 mm deep with 3H:1V side slope. However, that might be difficult to achieve. We have used 600 mm deep ditch from centre line of the road. Alternatively, ditch can be replaced with urban design involving curb & gutter.
2. The exiting storm (clay) sewer, which is collapsed, but likely provides drainage to foundation drains must be replaced.
3. Catchbasin #1 and catchbasin #2 currently are on private properties with discharge pipes toward Elgin Street. Since they drain the entire rear yard area of properties adjacent to Elgin and Yonge Streets, Arran-Elderslie should procure easement for catchbasin location, as well as storm sewers to properly maintain them. The new structures and associated sewers are shown at different locations than their existing location, to enable easement procurement.
4. The dip in the road profile that create valley like situation and traps stormwater runoff within Elgin Street has been eliminated. Elgin Street shall have positive slope towards Matilda Street to carry runoff to south.
5. **Figure 3** shows the construction of new storm sewer on Matilda Street.

It is recommended that municipality wait for the completion of Stormwater Study for Tara that is currently ongoing, before undertaking Elgin Street improvement. There may be other issues in Tara, that may impact the approach of carrying runoff on Elgin Street to the south and then to the west along Matilda Street.



— STORM DRAIN CONNECTIONS
— 227.80 — EXISTING CONTOURS (0.2m)
FFE FINISHED FLOOR ELEVATION

CAUTION: THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, PROPERTY LINES AND OTHER UNDERGROUND AND OVERGROUND UTILITIES ARE STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES, PROPERTY LINES & STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES, PROPERTY LINES & STRUCTURES, AND SHOULD ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

26/10/21	PRELIMINARY DESIGN
DD/MM/YY	DESCRIPTION
	REVISION / ISSUE



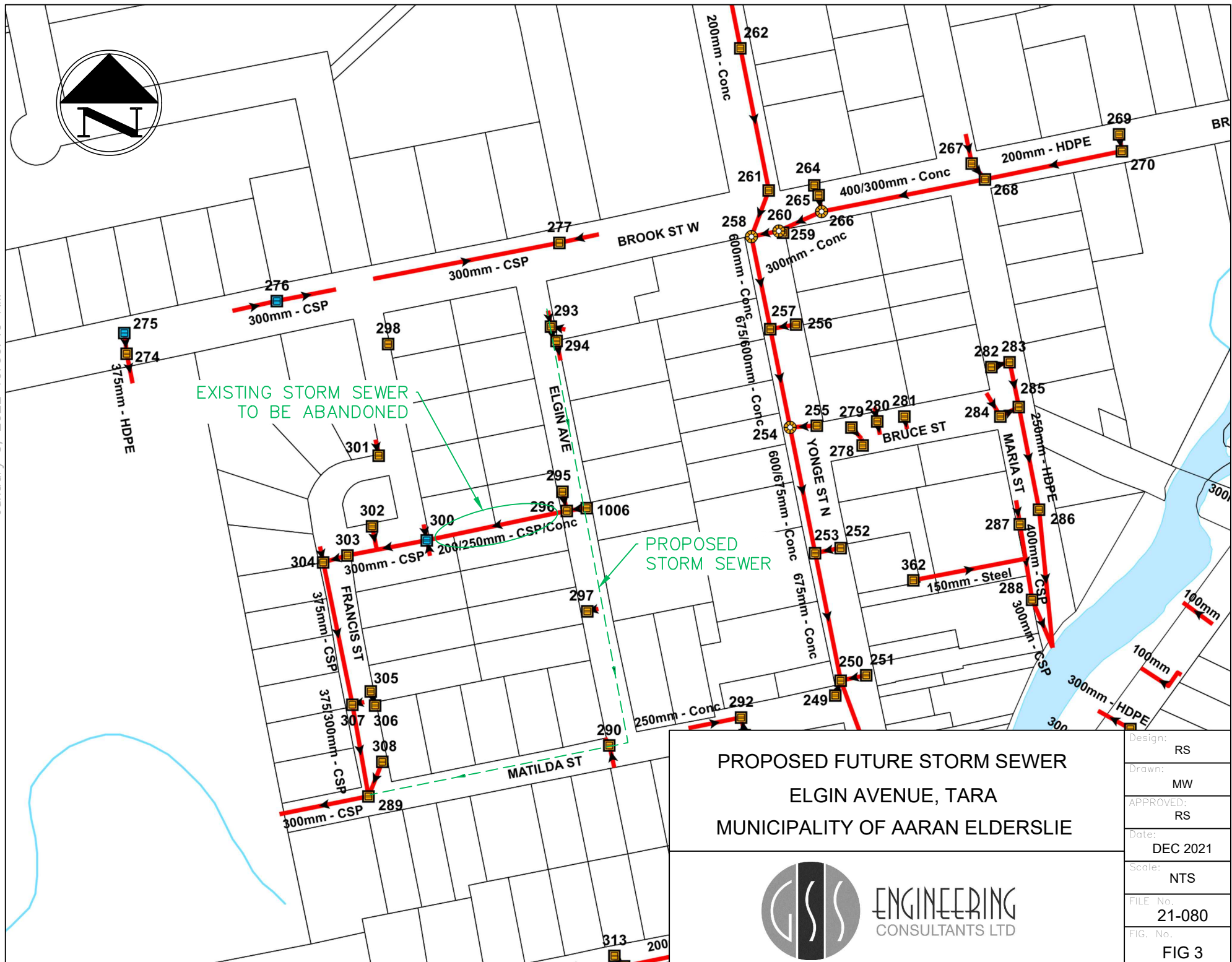
Unit 104D 1010 9th Avenue West, Owen Sound, ON, N4K 5R7
Telephone: (519) 372-4828

Title: PROPOSED CONCEPTUAL
DRAINAGE UPGRADES
ELGIN AVENUE, TARA
MUNICIPALITY OF ARRAN ELDERSLIE

Client: **ARRAN ELDERSLIE**

Design:	RS	Scale:	1: 400 HORZ. / 1: 40 VERT
Drawn:	MW	Approved:	Design Engineer
Checked:	RS		

Drawing No. 21-080-FIG 2



We suggest that this Letter Report be treated as an interim report to address Elgin Streets recent flooding problem. If there are any further questions, please do not hesitate to contact me.

Respectfully Submitted,

GSS Engineering Consultants Ltd.



Rakesh Sharma, P. Eng., Secretary-Treasurer
Designated Consulting Engineer

RS/nc
Encl.