



**TRITON
ENGINEERING
SERVICES
LIMITED**

Consulting Engineers

Memorandum

DATE: February 28, 2018

TO: Bill White

FROM: Chris Clark

RE: February 20, 2018 Rainfall
Event and Impacts of
Development, Harriston

FILE: A3139A

The following information is based on observations by Town staff, Triton Engineering and Maitland Valley Conservation Authority (MVCA) during the February 20, 2018 rainfall event within the Town of Minto, Harriston.

On Tuesday, February 20, 2018, over a period of approximately 48 hours, the Town of Minto (Harriston) and area experienced a rainfall event measuring 50mm in depth. In addition, the combination of snow melt and frozen ground surfaces significantly increased run-off volumes through the Town. In order to characterize the additional run-off rates produced by snow melt and frozen ground the flows through the Maitland River were measured by MVCA staff and compared to the flood frequency data analysis completed by Amec-Foster-Wheeler in June 2017. The measured flow rate yielded a value of 52.4 m³/s, while the flood frequency analysis indicates a flow of 53.1 m³/s being equal to a 10 year flood event. Therefore; it would be fair to characterize the February 20, 2018 rainfall event with the addition of snow melt and frozen ground surface being equal to a 10 year storm event.

During the course of the 48 hour time period, various streets in Harriston experienced flooding as the local storm sewer system became inundated, exceeding its design capacity. The following streets were observed to have ponding water within low lying sections; Young Street from George Street to King Street intersection, Maitland Street and George Street intersection as well as the intersection of George Street and William Street. Historically, these areas of the Town flood when water levels in the Maitland River rise, submerging the storm sewer outlets and surcharging the catchbasins within the mentioned streets.

More specifically, the George Street and William Street intersection storm sewer is a branch of the North Ward Trunk Storm System (NWTSS) which drains a large portion of farmland west of the Town of Harriston (see attached map). It can be rationalized that on February 20, 2018, a large portion of run-off was produced from this area due to amount of snow within the fields and the effects of frozen ground increasing run-off flow rates. The impacts of frozen ground surface increase run-off rates and run-off volumes due to the inability to infiltrate flows and acting as an impervious surface. A preliminary assessment of the NWTSS was completed analyzing a 5 year storm event. Run-off modelling indicated the NWTSS along Union Street and its contributing branches (William and George Street intersection) does not have sufficient capacity to convey a 5 year event. This is attributed to various factors; pipe grade (less than 0.2%), pipe size decreases between John Street and the Union Street outlet, and backwater constraints from the Maitland River during increased flow events. The effects of backwater are often observed within the various low points of the NWTSS due to the pipe elevations in the system being equal to that of the Union Street outlet elevation at the Maitland River.

Past preliminary investigations to improve the NWTSS recommended stormwater management measures be considered for the top end of the NWTSS to aid in the storage and attenuation of rainfall run-off volume and flows, respectively. As part of the 23 unit Townhouse development located on the former Minto-Clifford Public School property, a stormwater management (SWM) dry pond was designed to control post-development flows to pre-undeveloped conditions. The dry pond was also designed to accept future extraneous run-off from surrounding external drainage areas equalling approximately 4.03 ha in total drainage area. The dry pond was constructed in late 2017 and is designed to provide storage and flow control for the 100 year storm event in an attempt to relieve the NWTSS at this location. Based on the theoretical hydrologic modeling completed for this development, the dry pond is of adequate size to store rainfall run-off up to the 100 year storm event volume. However, as the pond

directly outlets to a branch of the NWTSS at the William Street right-of-way, when the NWTSS outlet pipe becomes submerged as the Maitland River water levels increase, water levels within the pond will also be equalized during rainfall events which exceed the capacity of the NWTSS.

During the course of the February 20, 2018 rainfall event, the Town's public works staff and Triton Engineering staff did not observe nor encounter signs of the dry pond breaching its banks and spilling into the William Street right-of-way. The flooding along and north of the William Street and George Street intersection was produced by a combination of uncontrollable and naturally occurring variables within the local watershed. These variables include; naturally occurring run-off produced by a 50mm rainfall event and snow melt conditions, an increased rate of run-off flows and volume due to frozen ground surface as well as backwater impacts through the NWTSS caused by increased water levels at the Maitland River Union Street outlet.

It is our opinion, the integration of the SWM dry pond at the proposed 23 Unit Townhouse development did not contribute to or negatively impact what has been an existing and ongoing flooding issue during rainfall events of this magnitude for years past. The dry pond has been sized to collect and store run-off up to the 100 year storm event for the subject site and future external areas thus, having no requirements to increase it's capacity at the present time.

Respectfully Submitted,

Triton Engineering Services Limited

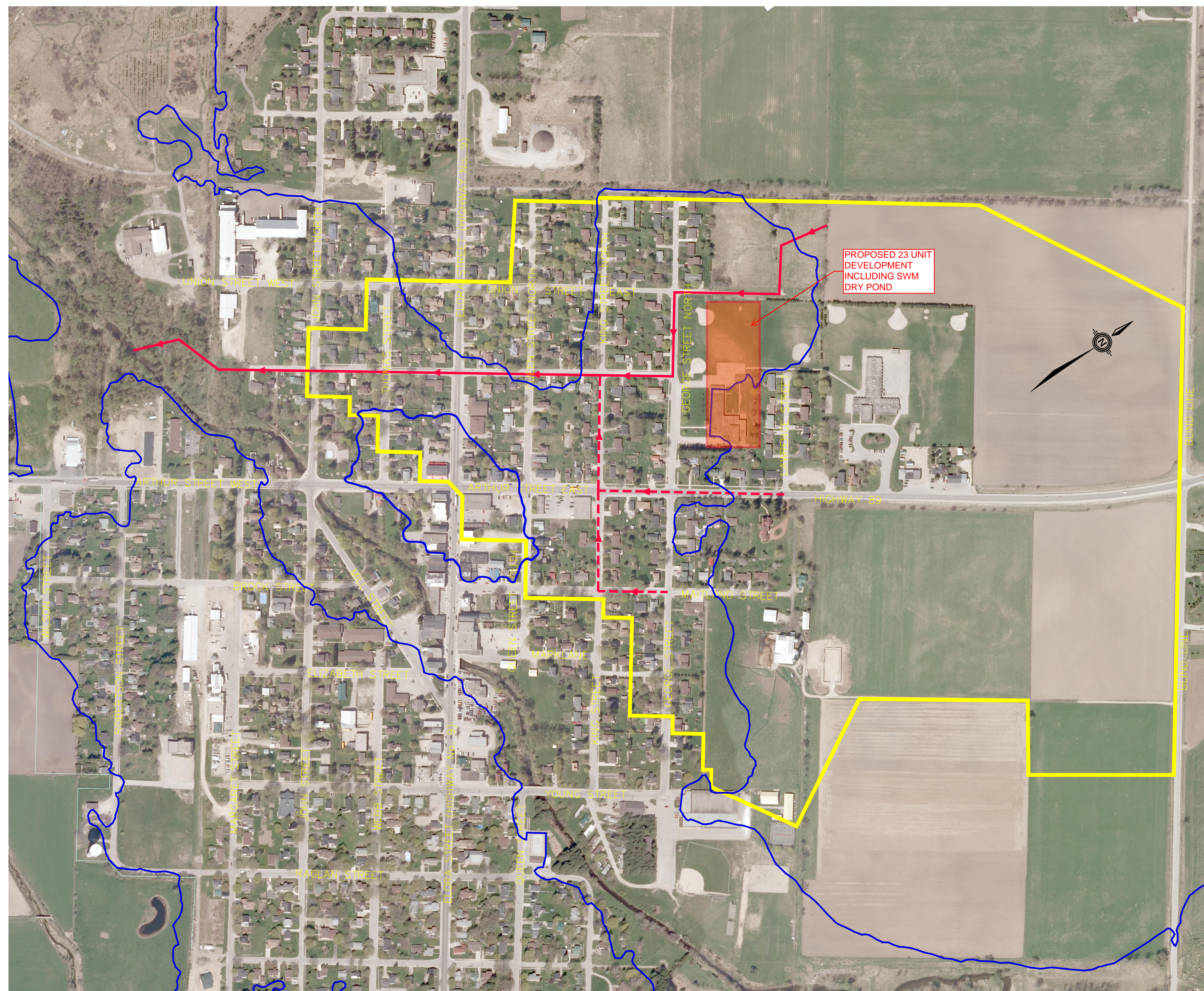
A handwritten signature in black ink, appearing to read "Chris Clark". The signature is fluid and cursive, with the first name "Chris" and last name "Clark" clearly distinguishable.

Chris Clark, P.Eng.

TOWN OF MINTO







**NORTH WARD
DRAINAGE STUDY
(HARRISTON)**

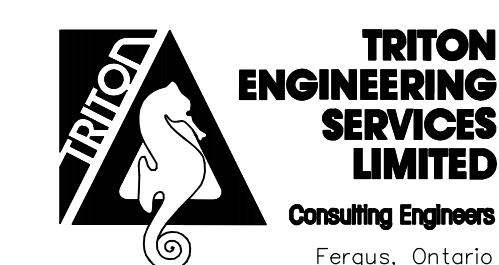


PROPOSED 23 UNIT
DEVELOPMENT
INCLUDING SWM
DRY POND

LEGEND:

-  NORTH WARD DRAINAGE BOUNDARY
-  TRUNK STORM SEWER
-  SECONDARY STORM SEWER
-  REGIONAL FLOODLINE

JULY 2011
A3139



SCALE - 1:3000