AQUAVIEW

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES

PROJECT No: 171203

LOT 1 - CONCESSION 1
LOT 10 - CONCESSION 2
AQUAVIEW

CITY OF OTTAWA

APRIL 2018

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs

REVISION 1

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES

LOT 1 – CONCESSION 1
LOT 10 – CONCESISON 2

CITY OF OTTAWA

AQUAVIEW

PREPARED BY:

ATREL ENGINEERING LTD
PROJECT NO. 171203

April 2018

Revision 1

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES
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ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES

1.0 BACKGROUND

1.1 General

Atrel Engineering Ltd has been retained by Minto Communities to complete an Assessment of Adequacy of Public Services in support of their Draft Plan to develop approximately 10.62 ha. in the City of Ottawa along Aquaview Drive. The development is separated into stages 1 and 2.

The south (Stage 1) development situated on Lot 10, Concession 2 is located south of Lakepointe Drive and east of Aquaview Drive. The north development (Stage 2) situated on Lot 1, Concession 1 is located north of Lakepointe Drive and west of Aquaview Drive as shown on ***Figure 1***. A more detailed sketch is provided in Appendix 'A' – SK-1 which shows the streets to which the development will be connected.

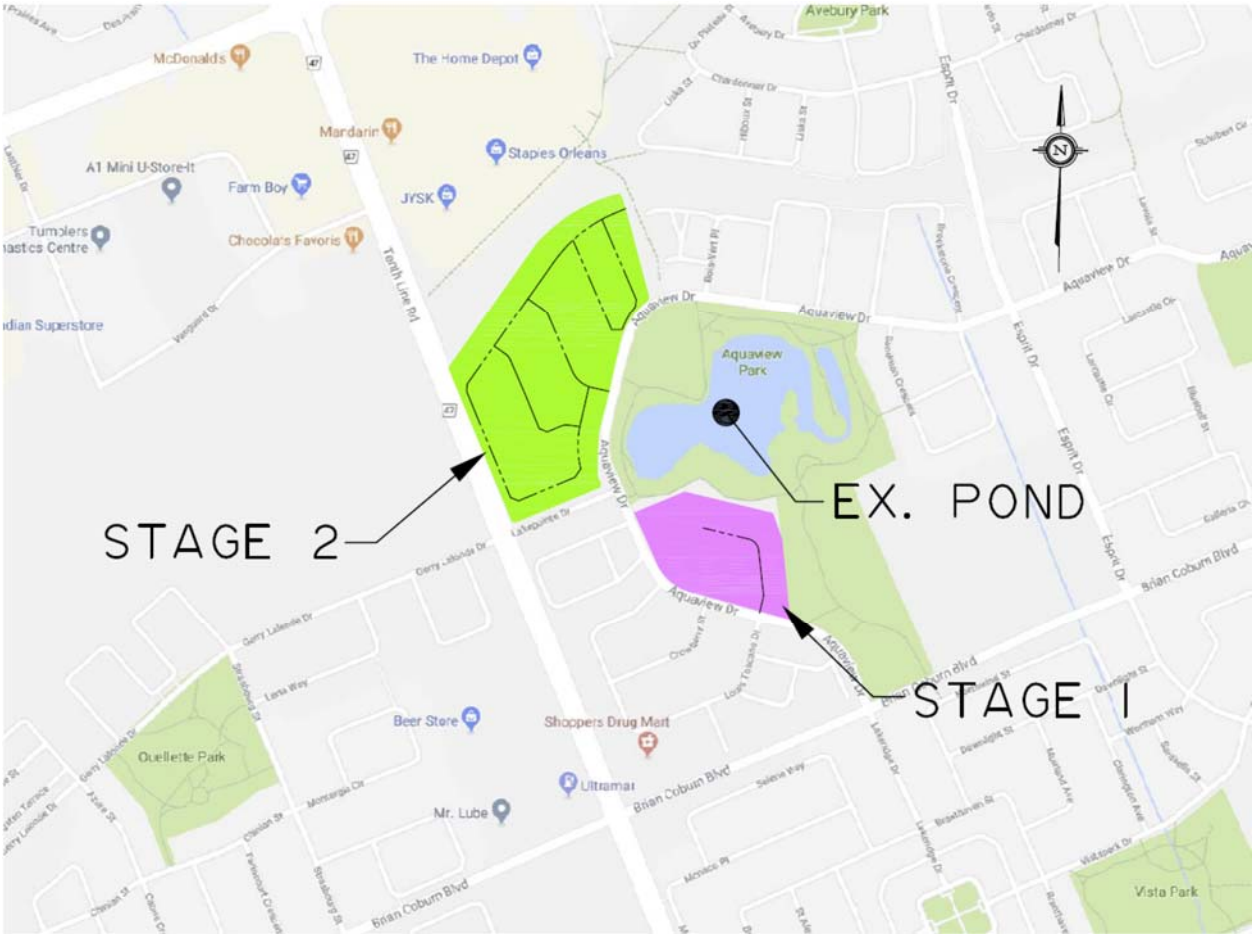


Figure 1 – Location Map

Aquaview, in total, incorporates approximately 48 single family units in stage 1 as well as 274 townhouse units of various types in stage 2.

The objective of this report is to provide analysis details to demonstrate that there is sufficient capacity in the watermain, the wastewater and stormwater systems to accommodate the proposed development.

1.2 Previously Approved Studies and Reports

- Cumming Cockburn Limited (CCL) report titled "SWM plan Neighbourhood 2 – Upper Billberry Creek Watershed – East Urban Community Expansion Area – February 2000"
- Atrel Engineering Limited (AEL) report titled "Design Brief (Stage 1, Sewer Outlets and Master Plans) – Revision 2" dated February 2000
- Atrel Engineering Limited report titled "Design Brief (Avalon Stage 5B) – Revision 1", dated June 2002
- Atrel Engineering Limited report titled "Design Brief (Avalon Stage 6B)", dated March 2004

1.3 Existing Services

As per AEL's and CCL's reports mentioned above, Aquaview's storm water runoff is to be included as tributary to the Neighbourhood 2 Storm Water Management (SWM) facility. Additionally, SCL's report mentioned above prescibes Aquaview's sanitary runoff to drain towards Esprit Drive as the downstream system has been designed accordingly. The site which is divided into stage 1 and stage 2 can be physically connected at the following locations (please refer to "Appendix 'A' – Street Map" for existing street locations):

Aquaview Stage 1

- there is an existing 400mm diameter watermain on Aquaview Drive
- there is an existing 375mm diameter sanitary sewer on Aquaview Drive
- there is an existing 900mm diameter storm sewer on Aquaview Drive.
- road connections are available
- Hydro, Bell Cable and Gas was not part of this preliminary serviceability study; it will be verified during the design process.

Aquaview Stage 2

- there is an existing 300mm diameter watermain on Aquaview Drive
- there is an existing 375mm diameter sanitary sewer on Aquaview Drive
- there is an existing 1350mm diameter storm sewer on Aquaview Drive
- road connections are available
- Hydro, Bell Cable and Gas was not part of this preliminary serviceability study; it will be verified during the design process.

1.4 Design constraints

i) Surface grading must be designed in order to convey the major overland flows to the existing stormwater management facility located in the middle of the proposed site.

ii) The major and minor storm systems flows will be captured by the existing stormwater management facility along Aquaview Drive.

iii) The sanitary sewer system of the proposed site will connect onto the existing sewers of the east urban community's Neighbourhood 2 on Aquaview Drive.

iv) The permissible grade raise restrictions for the site will be verified and further design shall be completed based on upcoming Paterson Group's Geotechnical Investigation.

v) As previously stated, Aquaview Drive offers the possibility of multiple connections onto its existing 300mm and 400mm diameter watermains.

1.5 Required Permits/Approvals

Development of the site would be subject to the City of Ottawa planning and development approval process. The City of Ottawa and the South Nation Conservation Authority must approve detailed engineering design drawings and reports prepared to support the proposed development prior to development. Environment Compliance Approvals (ECA) from the Ministry of Environment and Climate Change (MOECC) will need to be obtained in order to construct the sanitary sewers, storm sewers and watermain.

1.6 Pre-consultation

A pre-consultation meeting was carried out on February 28, 2018 with the City of Ottawa. The pre-consultation meeting records are attached in Appendix 'B' of this report.

2.0 PROPOSED SERVICES

2.1 Grading Plan - Geotechnical Investigation

A geotechnical investigation is simultaneously being carried out in order to assess the possible design constraints. Maximum grade raises will be verified once such investigation will be completed and the grading might be adjusted.

A macro grading plan was prepared based on providing a major system route and keeping the site at a minimum grade raise. (See Appendix 'C' – 171203-GRM).

2.2 Sediment and Erosion Control

Straw bales will be placed on-site at every definable swale in order to control runoff. These controls will be cleaned and maintained during the course of the construction. Before construction, silt fence barriers will be installed along the perimeter of the two stages (see Appendix 'C' – 171203-ESCM).

2.3 Watermain

The watermain analysis was conducted using the H2ONET v.5.0 program as a design aid.

Water supply to the Aquaview development will be provided through the installation of watermains.

This preliminary analysis was carried out with the use of hydraulic grade line elevations at various known connection points located at the boundaries of the proposed site. Hydraulic grade line elevations for the aforementioned connection points were provided by the City (see E-mail Correspondence with the City of Ottawa in Appendix 'D').

Stage 1 will be serviced by a connection to Aquaview Drive's existing 400mm diameter watermain.

Stage 2 will connect onto the Aquaview Drive 300mm diameter watermain at two separate locations. (See Appendix 'D' - 171203-WA1 – Watermain Size and Alignment).

Typical values for average daily water consumption were taken from the City of Ottawa's Water Distribution Guidelines. Since the proposed site consists of residential dwellings, the average daily water demand was taken to be 350 l/c.d. The following table is an excerpt from the City's Guidelines.

Water Supply Design Criteria

Type of development	Average daily demand	Maximum daily	Maximum hourly
Residential	350 l/c·d	2.5 x avg. day	2.2 x max day

Total demands for the three different scenarios were calculated using the aforementioned demand values as well as population densities of 3.4 persons per unit for single family dwellings and 2.7 persons per unit for townhouses. Please refer to drawing 171203-WA2 for water layout and average day demands.

The following table summarizes the anticipated water demand for the proposed development.

Type of Development	Average Daily Demand	Maximum Daily	Peak Hour
Residential	350 l/c.d	2.5 x Average Day	5.5 x Average Day
Stage 1 (South)	0.6611 l/s	1.6528 l/s	3.6361 l/s
Stage 2 (North)	2.9969 l/s	7.4923 l/s	16.4830 l/s

The studied water supply network was verified during average day demand and peak hourly demand with a minimum pressure of 276 kPa and found to satisfy all requirements. Some single family dwellings, part of stage 1, will be directly connected to the 400mm diameter watermain on Aquaview Drive. A direct connection to the watermain will provide adequate flow and pressure for water consumption in the case of these single family dwellings. Additionally, existing hydrants on Aquaview Drive should provide adequate servicing for firefighting purposes as they are directly connected to the existing 400mm watermain. Further analysis shall be provided during the detailed design process. It is however safe to assume that fire flows will be satisfactory as the hydrants are directly connected to the 400mm watermain.

Fire flows of 167 l/s (single dwellings), 250 l/s (townhouses) and 283 l/s (back to back townhouses) were also simulated during maximum day conditions with a required minimum residual pressure of 140 kPa. Please refer to tables 101 to 105 in Appendix 'D' for analysis results. Furthermore, table 106 details the fire flow calculation procedure in accordance with the Fire Underwriters Survey.

2.3.1 Fire Underwriters Survey

Section 4.2.11 of the City of Ottawa Guidelines for water distribution offers guidance for the calculation of fire demand.

Furthermore, the Ontario Building Code (OBC) provides minimum requirements for fire protection on private properties. In particular, Section 7.2.11 of the OBC provides detailed steps for the installation of water service pipes and fire service mains. Part 3 of the OBC offers requirements for fire protection, sub-section A3.2.5.7 provides standards for firefighting.

An analysis was carried out to ensure the water quantity would be sufficient for firefighting purposes. Preliminary calculations determined that the proposed watermain system will satisfy the required fire flows of 167 l/s, 250 l/s and 283 l/s (Please refer to table 105 for maximum day demand plus fire flow analysis results). The system will be further analyzed during the detailed design process.

2.4 Sanitary Sewer

The sanitary runoff of this development will discharge into the existing sewers on Aquaview Drive (see drawing 171203-SANM for details in Appendix 'E').

The preliminary sanitary system was designed using, in part, the City of Ottawa Sewer Design Guidelines dated October 2012. Section 4.3 provides standards for population densities in Ottawa. The following table shows the "Per Unit Populations" used:

Table 3: Per Unit Populations

Unit Type	**Persons per unit**
Single Family	3.4
Townhouses	2.7

The City has recently released a technical bulletin (Technical Bulletin ISTB-2018-01) with updated sanitary design parameters for flow criteria. The updated design parameters used for this analysis are tabulated below:

Table 4: Design Parameters

Parameter	Design
Residential Flow Rate (l/d/cap)	280
Commercial Flow Rate (l/d/gross ha.)	28,000
Institutional Flow Rate (l/d/gross ha.)	28,000
Infiltration Rate – Dry Weather (l/s/ha.)	0.05
Infiltration Rate – Wet Weather (l/s/ha.)	0.28
Total Infiltration Rate (l/s/ha.)	0.33
Harmon Correction Factor	0.8

The notable changes which apply to this analysis are:

- The residential flow rate lowered from 350 l/d/cap to 280 l/d/cap
- The infiltration rate increased from 0.28 l/s/ha. to 0.33 l/s/ha.
- The Harmon correction factor lowered from 1.0 to 0.8

In order to ensure that the existing system is not negatively affected by the proposed development, a comparison analysis was conducted between the previously approved studies for Avalon Stage 5B, which included the design of the Aquaview Drive sanitary sewer, and the new design presented herein. The following equations were used to calculate tributary sanitary flows:

$$Peaking\ Factor = PF = 1 + \left[\frac{14}{4+\left[\frac{Pop.}{1000}\right]^{\frac{1}{2}}}\right] * K$$

$$Infiltration = Area * Infiltration\ Rate$$

$$Flow = \frac{Pop. * Flow\ Rate * PF}{86400}$$

$$Total\ Flow = Flow + Infiltration$$

The previously approved developments is the Avalon Stage 5B site approved in 2002 which incorporates all areas and populations tributary to the Aquaview Drive sanitary sewer.

The new Aquaview site's sanitary runoff was calculated using the new design parameters while the original development's flows were calculated using the old parameters in the above mentioned studies.

In order to ensure the proposed development does not have adverse effects on the sanitary system, a flow comparison was conducted between the Avalon Stage 5B system and the updated system which includes the newly designed Aquaview site. The analysis' boundary was set as existing sanitary manhole 227 located at the intersection of Aquaview Drive and Bois Vert Place. The sanitary sewer analyzed was the existing 375mm diameter sewer located from existing sanitary maintenance holes 222 to 227. This sewer was chosen as the analysis' boundary as it is located directly downstream from the proposed Aquaview site and all downstream tributary areas are developed. For the purpose of this analysis this sanitary sewer will be referred to as the boundary sewer.

The sanitary sewer computation form (Avalon Stage 5B – June 2002 – Revision 1) calculations show a sanitary flow of 48.21 l/s within the boundary sewer. The new design detailed in Table 107 of this report shows a sanitary flow of 37.36 l/s within the boundary sewer. The areas and populations have changed as the Avalon Stage 5B analysis included estimated lumped areas and populations upstream of the boundary sewer. The existing areas and populations upstream of the boundary sewer coincide with the detailed Avalon Stage 6B analysis.

The boundary sewer provides an ultimate capacity of 63.84 l/s. Therefore, the tributary developments to the boundary sewer will be adequately serviced by the existing Aquaview Drive sewers.

As the analysis shows, both Stages 1 and 2 contribute considerably less flow to the existing system due in large part to the decreased overall population density.

The total flows for each stage of the development represent the additional demand that will be imposed on the existing Neighbourhood 2 sanitary system. As shown in the table above, the proposed development will create lesser sanitary flows in comparison to the previously approved studies.

The analysis demonstrates that Aquaview Stages 1 and 2 will connect onto the existing system without negatively affecting upstream existing developments nor affecting downstream existing sanitary systems.

Both the design sheet and the drawing show that the pipe depths and capacities are sufficient to service the proposed development.

2.5 Storm Sewer

As mentioned, CCL's report prescribes for the Aquaview development's storm runoff to be directed to the existing Neighbourhood 2 SWM pond. This existing SWM facility controls for both quantity and quality criteria of the storm water from Neighbourhood 2 and will include the Aquaview development, Stages 1 and 2 (See Appendix 'F' – 171203-STMM). The attenuated flow is then discharged via a storm sewer to the Tenth Line Road sewer system. The SWM pond's 100 year storm event level is 85.90m according to the previously approved studies. Similarly, the hydraulic grade line elevation for the 100 year storm at the existing storm maintenance hole G immediately upstream of the SWM pond is 86.00m. This elevation was used in the storm sewer computation forms presented in Appendix 'F'.

The reference numbers for the Ministry of the Environment Certificates of Approval regarding the existing Stormwater Management Facility and the existing storm sewers of Avalon Stage 5 and 6B, which include the sewers on Aquaview Drive are as followed:

- ECA#7205-4JQHFV (Neighbourhood 2 SWM Facility)
- ECA#8709-5DHGWX (Avalon Stage 5)
- ECA#9730-5Y8KQT (Avalon Stage 6B)

The design flows for the current project were calculated using both the 2 & 5 year Intensity Duration Frequency (IDF) curve from the City of Ottawa. The minor drainage systems for stages 1 and 2 of the proposed development were designed to carry a flow equivalent to a 1 in 2 year storm event with a 10 minute inlet time. A flow equivalent to a 1 in 5 year storm and a 20 minute inlet time was used for the existing areas of Avalon Stages 5B and 6B. The resulting computation form detailing the storm sewer system characteristics up to the SWM facility are presented in Appendix 'F' (see Table 110).

Storm flows for both stages are directly discharged into the existing storm sewers on Aquaview Drive.

The main storm drainage design constraints can be summarized as follows:

a) Minor System
    1) Inflow rate into the minor system should be limited to 70 l/s/ha, as per CCL's report.
    2) All residential inlets will be equipped with inlet control devices. The term "inlet" means "a single catchbasin" or "a group of interconnected catchbasins" connected by a single lead into the minor system.
    3) The hydraulic grade line shall be computed and the maximum permitted hydraulic grade line elevation is to be 0.30m below the underside of footing.

b) Major System
    1) Grading design is to be based on split lot drainage.
    2) On street routing to emergency storage area must be provided and illustrated on the grade control plan. This routing must incorporate a maximum 0.35m flow depth on street under either static or dynamic conditions. An overall positive slope of 0.10% will be required across consecutive high points for routing purposes.

c) Water Quality
    1) An Enhanced Level of Protection (80 % removal of Total Suspended Solids) needs to be achieved in the stormwater management wet pond. The Best Management Practices should also be implemented within the subdivision design and during construction.

A storm sewer computation form details the calculations for the system restricted to a minor system inflow rate of 70 l/s/ha and includes the calculated hydraulic grade line to ensure that a freeboard of 0.30 m is provided within both the proposed and existing developments tributary to the system (see Table 111 in Appendix 'F').

The design sheets and the drawing show that the pipe depths and capacities are sufficient to service the proposed developments.

The minor system capture rate could be increased during the detailed design process for the proposed development and/or the existing developments in order to increase the level of service and maximize the minor system's utility. This could be achieved by removing links between existing catchbasins and/or upsizing existing inlet control devices.

3.0 CONCLUSION

This report demonstrates that the proposed Aquaview development can be serviced by connecting to the existing sanitary sewers as indicated in Atrel's master servicing study and other previously approved studies. The storm sewer system will be designed in conformance with the City of Ottawa standards and outlet to the Neighbourhood 2 SWM pond as originally prescribed in CCL's report. The existing watermain on Aquaview Drive will provide an adequate level of servicing for both water consumption and firefighting purposes.

Based on the information provided in this report, the Aquaview development can be serviced to meet the City of Ottawa requirements.

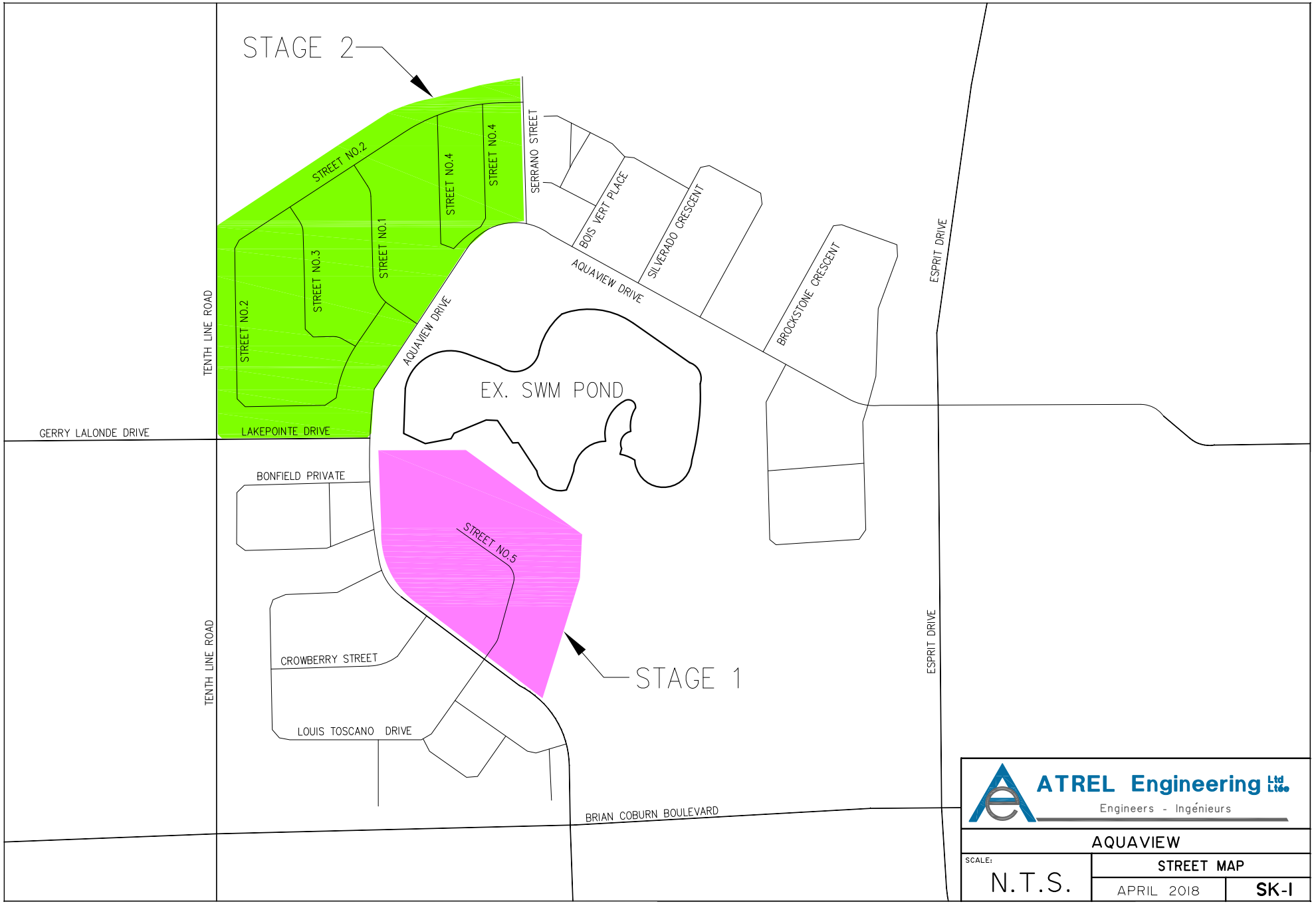
Prepared by:

ATREL ENGINEERING LTD

André Sauvé, P. Eng.

APPENDIX "A"

SK-1 Street Map


STAGE 2
STREET NO.2
STREET NO.4
STREET NO.4
SERRANO STREET
BOIS VERT PLACE
SILVERADO CRESCENT
BROCKSTONE CRESCENT
ESPRIT DRIVE
AQUAVIEW DRIVE
AQUAVIEW DRIVE
STREET NO.1
STREET NO.3
STREET NO.2
TENTH LINE ROAD
EX. SWM POND
GERRY LALONDE DRIVE
LAKEPOINTE DRIVE
BONFIELD PRIVATE
STREET NO.5
STAGE 1
CROWBERRY STREET
LOUIS TOSCANO DRIVE
TENTH LINE ROAD
ESPRIT DRIVE
BRIAN COBURN BOULEVARD
ATREL Engineering Ltd
Engineers - Ingénieurs
AQUAVIEW
SCALE:
N.T.S.
STREET MAP
APRIL 2018
SK-1

APPENDIX "B"

Pre-consultation meeting records

Andre Sauve

From: Lebrun, Julie (Planning) <Julie.Lebrun@ottawa.ca>
Sent: Tuesday, March 13, 2018 8:16 AM
To: 'Susan Murphy'; 'De Santi, Nadia'
Cc: Curry, William; Young, Mark; Wood, Mary Ellen; Yousfani, Asad; Andre Sauve; Harte, Andrew
Subject: Minto Aquaview

Good morning all,

As a follow-up to our pre-application consultation of Wednesday, February 28th, we would like to provide the following:

- Minto is proposing a phased draft plan of subdivision;
- One phase is located at 352 Aquaview Drive and is proposing 48 single detached dwellings on a cul-de-sac;
- The other phase (core block) is located at the intersection of Tenth Line Road, Lakepointe Drive and Aquaview Drive immediately south of the future Transitway corridor and station; it will contain a mix of rear lane townhomes, back to back townhomes and traditional townhomes on public streets.

Preliminary Comments:

Urban Design:

- Considering mixing higher density residential with the singles at 352 Aquaview Drive;
- In core block, move higher density residential closer to Tenth Line road and adjacent to the future transit station;
- Rear lane, 3 storey townhomes, should be facing Lakepointe Drive and all of Aquaview Drive to provide street presence across from the pond and help slow down traffic;
- Ensure there is a street connection and a MUP along the eastern boundary of the core site to the transitway lands; this connection was being reserved for an access for buses to the transit corridor and may still be required in the future;
- A second pedestrian connection should be located mid-block to provide a link to the transit corridor to connect to the future extension of the Major Recreational Pathway;

Parks:

- Parks will request land dedication of 1.11ha as parkland through the draft plan of subdivision based on the proposed and existing unit count. The proposal of 322 units plus the existing Neighbourhood 2 unit count of 968 units equal a total of 1290 units. Parkland dedication will be calculated using 1ha/300 dwelling units resulting in a required parkland dedication of 4.3ha. Existing Aquaview Park has an area of 3.19ha.
- The layout of Phase 2 to include a 1.11ha Parkette. The Parkette is to be centrally located within the neighbourhood, providing an interesting focal point and contributing to the community character. The Parkette is to be rectangular in shape, to maximize recreational opportunities and located along local roads with a minimum of 50% street frontage. A range of active and passive recreation opportunities shall be proposed within the parkette. Please refer to the Park Development Manual – Second Edition 2017 for more information on Parkette design and requirements.
- In addition, please introduce a MUP on the east side of the existing 20m ROW to facilitate a pedestrian connection from Aquaview Drive to the proposed BRT corridor.
- A walkway block should be added from Street 14 within Phase 1 to increase pedestrian connectivity.

Required Plans, Reports and Studies (Plans 15 copies / Reports 3 copies unless otherwise indicated)**:**

Draft Plan of Subdivision
Topographical Plan of Survey (2 copies)
Planning Rationale (4 copies)
Phase 1 Environmental Site Assessment (Phase 2 ESA if required by Phase 1 ESA)
Design Brief/Stormwater Management Report complete with Modeling
Geotechnical Report
Supporting Modeling; Existing Stage 6B with the proposed areas inclusive.
Landscape Plan, Details
Tree Conservation Report
Environmental Impact Statement
Archeological Resource Assessment
Transportation Impact Study and Road Modification Plan if required
Noise and Vibration Study

Engineering:

- Grading Plan & Drainage Plan
- General Plan of Services
- Plan and Profile Plans
- SWM Plans
- Erosion & Sediment Control Plan
- Composite Utility Plan
- Details/road cross sections

Consultant to Coordinate with the Conservation Authority
Consultant to provide Boundary Condition Request

Minimum Drawing and File Requirements- All Plans

Plans are to be submitted on standard **A1 size** (594mm x 841mm) sheets, utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400, or 1:500).
With all submitted plans and reports please provide an individual PDF format of the files.

Tree Conservation Report:

1. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City; an approved TCR is a requirement of Site Plan or Plan of Subdivision approval
2. any removal of privately-owned trees 10cm or larger in diameter require a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
3. in this case, the TCR may be combined with the EIS
4. the TCR must list all trees on site by species, diameter and health condition. Groupings of trees may be combined together using averages, and diameter ranges. Note that the TCR must address all trees with a critical root zone that extends into the developable area.
5. If trees are to be removed, the TCR must clearly show where they are and document the reason they can not be retained
6. All retained trees must also be shown and all retained trees within the area impacted by the development process must be protected as per the City guidelines listed on Ottawa.ca
7. Trees with a trunk that crosses/touches a property line are considered co-owned by both property owners; permission from the adjoining property owner must be obtained prior to the removal of co-owned trees
8. the City does encourage the retention of healthy trees wherever possible; please ask your design/planning team to find opportunities for retention wherever possible if the trees are healthy and will contribute to the design/function of the site. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca

9. the removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR; note that Forestry Services may ask for compensation for any City-owned tree that has to be removed.

The list of plans and reports noted above is preliminary and therefore the City reserves the right to request additional plans and reports as necessary.

Regards,

Julie Lebrun, MCIP, RPP (MICU, UPC)
Planner / Urbaniste
Development Review, Suburban Services East /
Examen des demandes d'aménagement, Services suburbains est
Planning, Infrastructure and Economic Development /
Services de planification, d'infrastructure et de développement économique
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27816
ottawa.ca/planning / ottawa.ca/urbanisme

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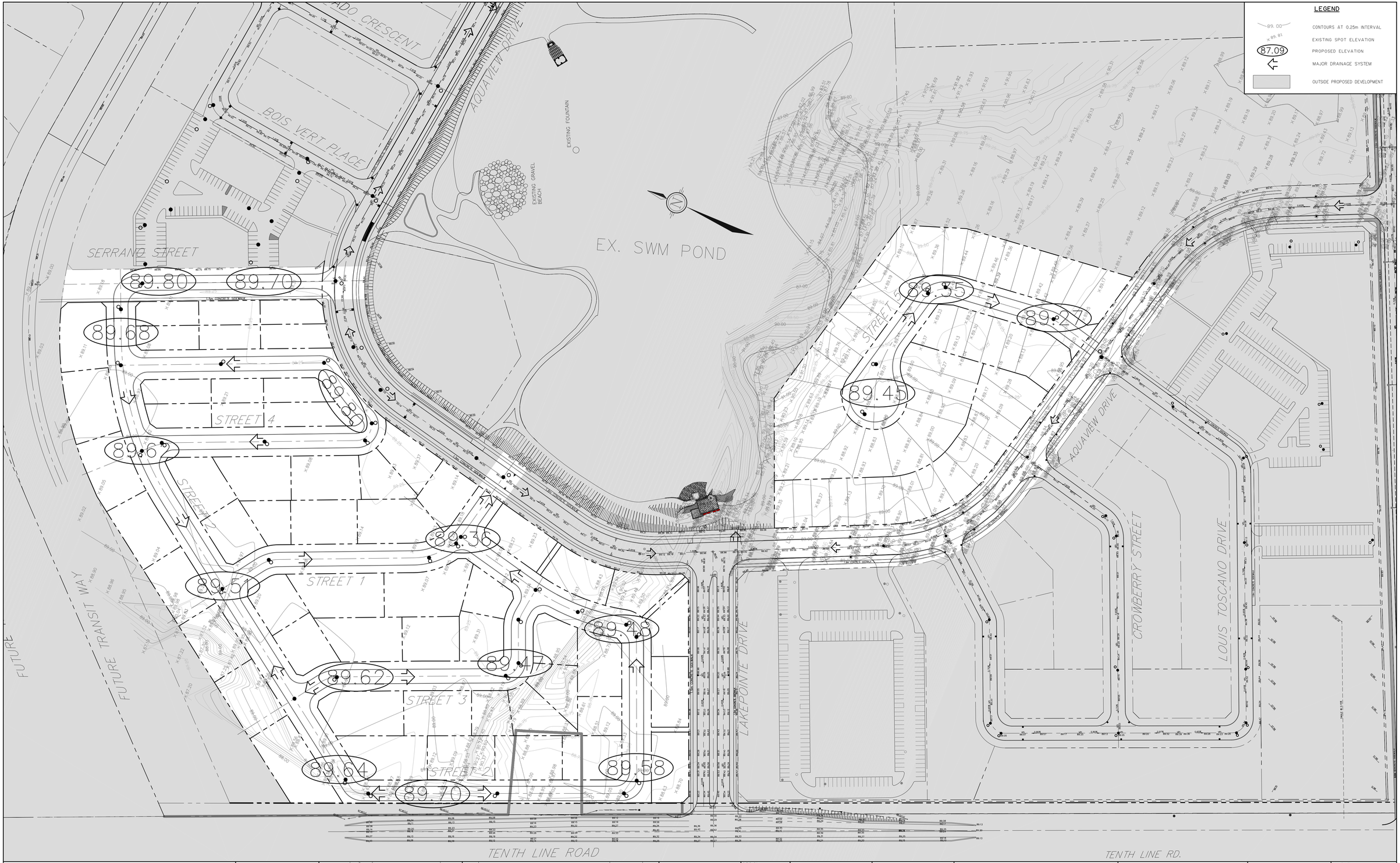
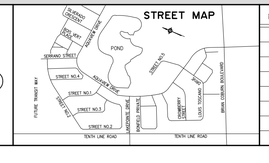
APPENDIX "C"

171203-GRM - Macro Grading Plan
171203-ESCM - Macro Erosion and Sediment Control Plan



THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

STREET MAP



No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY
1	REVISED AS PER CITY COMMENTS	APR. 30/18	AGS

SCALE
1 : 1000
10m 0 10 20 30m

DESIGN	VLL
CHECKED	AGS
DRAWN	VLL
CHECKED	AGS
APPROVED	AGS

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Apr. 30, 2018
PROVINCE OF ONTARIO

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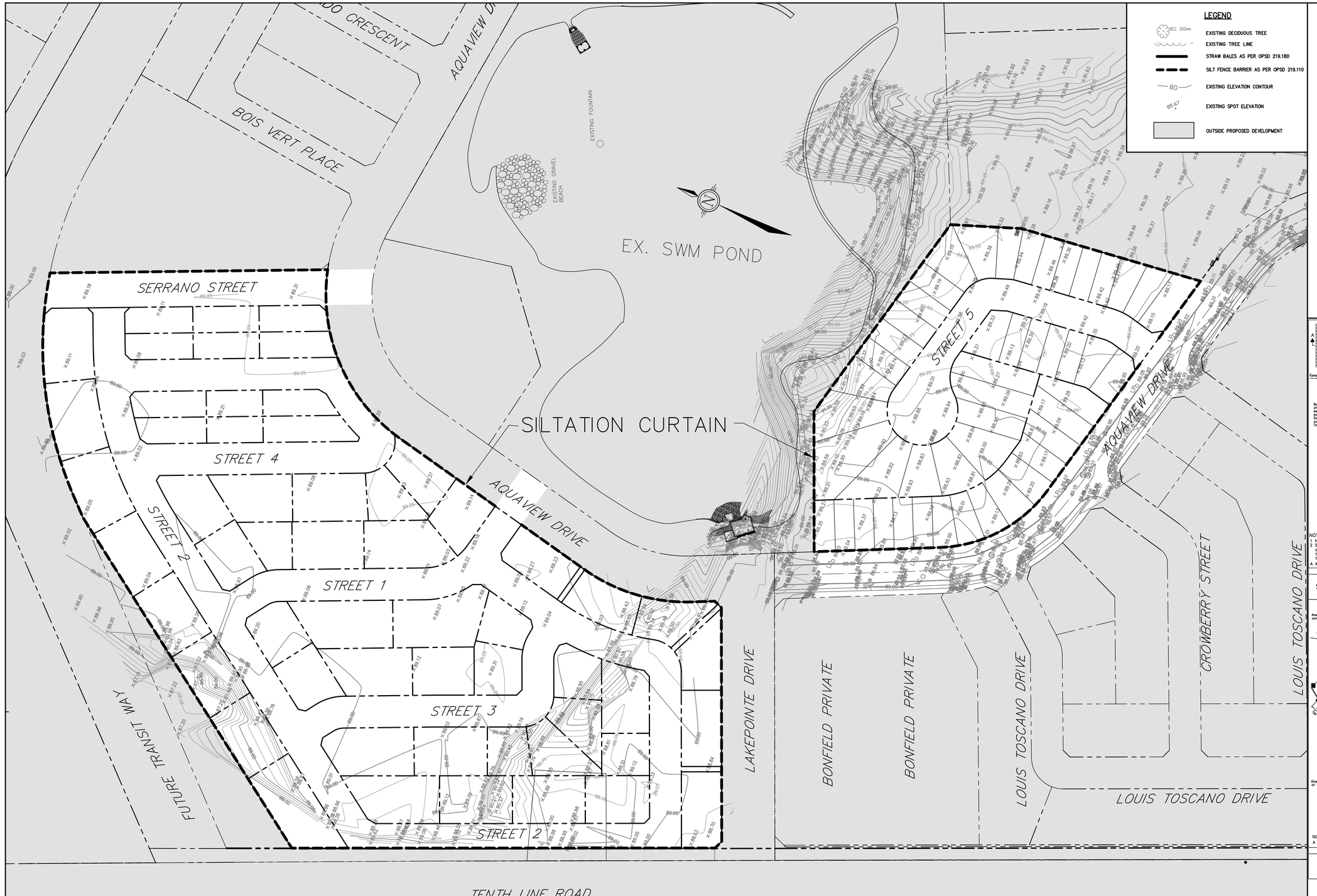
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

CITY OF OTTAWA
AQUAVIEW

MINTO COMMUNITIES INC.

CLIENT No. 148
PROJECT No. 171203
DRAWING No. 171203-GRM

PLAN
MACRO GRADING PLAN

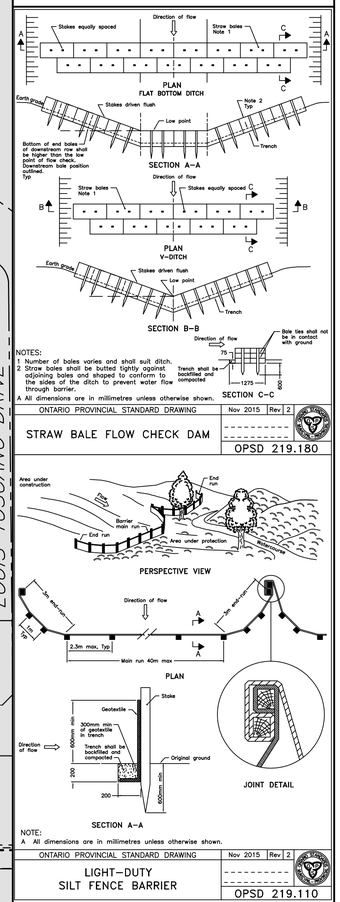


LEGEND

- EXISTING DECIDUOUS TREE (DEC 300mm)
- EXISTING TREE LINE
- STRAW BALES AS PER OPSD 219.180
- SILT FENCE BARRIER AS PER OPSD 219.110
- 80 — EXISTING ELEVATION CONTOUR
- 95.67 + — EXISTING SPOT ELEVATION
- OUTSIDE PROPOSED DEVELOPMENT

NOTES

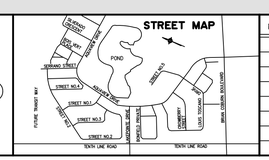
1) ADDITIONAL TO THIS PLAN, THE CONTRACTOR SHALL IMPLEMENT THE "BEST MANAGEMENT PRACTICE" ALL ALONG CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE TO INSTALL, INSPECT, REPAIR AND REMOVE THE SEDIMENT AND EROSION CONTROL METHODS
2) A SUMP OF 600mm IN DEPTH WILL BE PROVIDED IN ALL CATCHBASINS IN ORDER TO MINIMIZE THE AMOUNT OF SUSPENDED SOLIDS FROM ENTERING THE SEWER SYSTEM.
3) DURING CONSTRUCTION, FILTER CLOTH WILL BE PLACED UNDER ALL CATCHBASIN AND MANHOLE FRAMES AND COVERS AND STRAW BALES WILL BE PLACED WHERE RUNOFF CAN CARRY EXCESSIVE SEDIMENTS INTO THE SEWER SYSTEM.
4) STRAW BALES SHALL BE INSTALLED ALONG THE VARIOUS SWALES (MAN MADE OR EXISTING) WHERE JUDGED NECESSARY BY THE ENGINEER AND/OR THE CITY OF OTTAWA'S INSPECTOR.
5) STRAW BALES SHOULD BE INSTALLED AS PER OPSD 219.100 AND OPSD 219.180 AS APPROPRIATE.
6) STRAW BALES SHALL BE INSTALLED AT EVERY MAJOR POINT OF WATER ENTRY INCLUDING DITCH INLET CATCHBASINS AND CULVERTS.
7) ALL SEDIMENT CONTROL LOCATIONS MUST BE INSPECTED ON A DAILY BASIS ESPECIALLY FOLLOWING A RAINFALL EVENT. SEDIMENTS SHALL BE REMOVED AND CONTROLS REINSTALLED AS NECESSARY.
8) SHOULD IT BE IMPOSSIBLE TO PREVENT OVERLAND SHEET FLOW TO AN EXTERNAL AREA DURING THE CONSTRUCTION PHASE; SUCH AREA SHALL BE PROTECTED WITH A SILT FENCE AS PER OPSD 219.110 AND/OR FILTER CLOTH IN CATCHBASINS.
9) FILTER CLOTH IN CBs SHOULD BE INSTALLED WITH GENEROUS EXCESS OF MATERIAL AROUND PERIMETER TO FACILITATE REMOVAL. FOR CBs POTENTIALLY SUBJECTED TO HEAVING SEDIMENT LOADING, A GRANULAR "PRE-FILTERED" SHOULD BE PROVIDED AROUND PERIMETER OF CB OR AT INTERVALS ALONG THE CURB.
10) ANY MATERIAL STOCKPILES SHOULD BE LOCATED ON FLAT AREAS WELL AWAY FROM ANY DRAINAGE INLETS.
11) NO SEDIMENT CONTROL STRUCTURES SHALL BE REMOVED UNLESS FOUND UNNECESSARY OR ANOTHER SEDIMENT CONTROL POINT IS INSTALLED ELSEWHERE TO REPLACE THE LATTER.
12) THE SEDIMENT AND EROSION CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY.
13) THIS PLAN IS A "LIVING DOCUMENT" AND THAT ANY MODIFICATION TO THE PLAN SHALL BE SUBMITTED TO THE SATISFACTION OF SNC AND MAY BE MODIFIED BY SNC STAFF.



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
STRAW BALE FLOW CHECK DAM		OPSD 219.180

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT–DUTY SILT FENCE BARRIER		OPSD 219.110

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.



No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY

SCALE 1 : 1000 (10m 0 10 20 30m)

DESIGN	VLL
CHECKED	AGS
DRAWN	VLL
CHECKED	AGS
APPROVED	AGS

LICENSED PROFESSIONAL ENGINEER — A. G. Y. SAUVE — 100142393 — Apr. 3, 2018 — PROVINCE OF ONTARIO

ATREL Engineering Ltd. Ltée.
Engineers - Ingénieurs
1-2864 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

CITY OF OTTAWA
AQUAVIEW

MINTO COMMUNITIES INC.

CLIENT No. 148
PROJECT No. 171203

PLAN MACRO EROSION AND SEDIMENT CONTROL PLAN

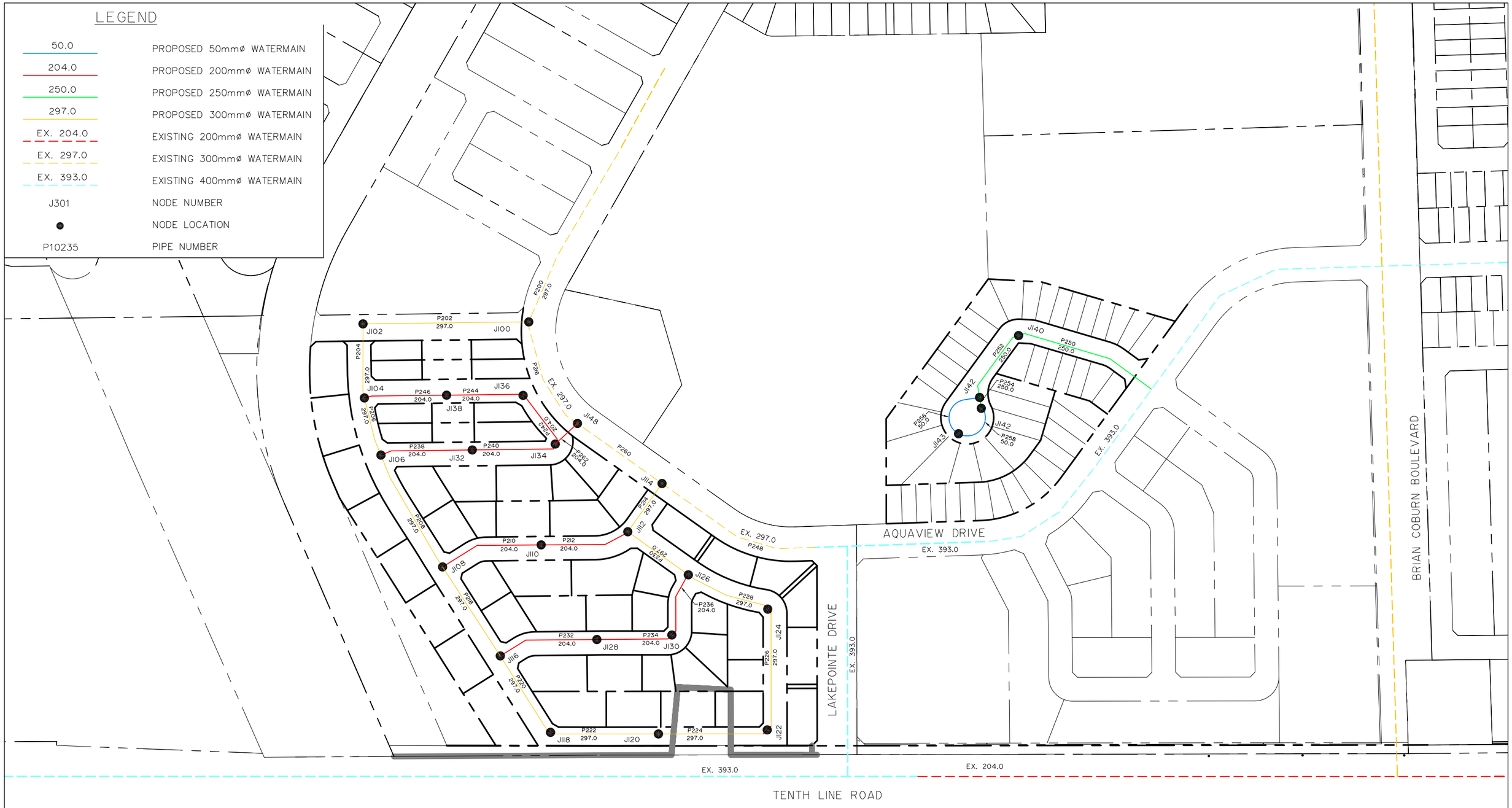
DRAWING No. 171203-ESCM

APPENDIX "D"

171203-WA1 - Watermain Size and Alignment
171203-WA2 - Watermain Layout and Demand
Table 101: Node Data
Table 102: Pipe Data
Table 103: Reservoir Data
Table 104: Average Day and Peak Hour Demand Results
Table 105: Maximum Day plus Fire-Flow Results
Table 106: Fire Flow Calculations
E-mail Correspondence with the City of Ottawa – Boundary Conditions

LEGEND

50.0	PROPOSED 50mmø WATERMAIN
204.0	PROPOSED 200mmø WATERMAIN
250.0	PROPOSED 250mmø WATERMAIN
297.0	PROPOSED 300mmø WATERMAIN
EX. 204.0	EXISTING 200mmø WATERMAIN
EX. 297.0	EXISTING 300mmø WATERMAIN
EX. 393.0	EXISTING 400mmø WATERMAIN
J301	NODE NUMBER
●	NODE LOCATION
P10235	PIPE NUMBER



DRAWN: JSG	DESIGN: JSG
SCALE: N.T.S.	

ATREL Engineering Ltd. Ltée.
Engineers - Ingénieurs

CITY OF OTTAWA

AQUAVIEW

PLAN
WATERMAIN SIZE AND ALIGNMENT

CLIENT No.	148
PROJECT No.	171203
DATE	APRIL 2018
DRAWING No.	171203-WA1

RES 1000
CONNECTION POINT 1
(MODELED)

RES 1002
CONNECTION POINT 2
(MODELED)

RES 1004
CONNECTION POINT 3

AQUAVIEW DRIVE

LAKEPOINTE DRIVE

BRIAN COBURN BOULEVARD

TENTH LINE ROAD

EX. 297.0

EX. 393.0

EX. 204.0

JI00 JI02 JI04 JI06 JI08 JI10 JI12 JI14 JI16 JI18 JI20 JI22 JI24 JI26 JI28 JI30 JI32 JI34 JI36 JI38 JI40 JI42 JI43 JI48

10 | 2.7 | 0.1094
8 | 2.7 | 0.0875
8 | 2.7 | 0.0875
16 | 2.7 | 0.1750
11 | 2.7 | 0.1203
12 | 2.7 | 0.1313
18 | 2.7 | 0.1969
13 | 2.7 | 0.1422
19 | 2.7 | 0.2078
24 | 2.7 | 0.2625
17 | 2.7 | 0.1859
12 | 2.7 | 0.1313
23 | 2.7 | 0.2516
16 | 2.7 | 0.1750
20 | 2.7 | 0.2188
10 | 2.7 | 0.1094
10 | 2.7 | 0.1094
12 | 2.7 | 0.1313
15 | 2.7 | 0.1641
18 | 3.4 | 0.2479
7 | 3.4 | 0.0964
6 | 3.4 | 0.0826

LEGEND

	PROPOSED 50mmø WATERMAIN
	PROPOSED 200mmø WATERMAIN
	PROPOSED 250mmø WATERMAIN
	PROPOSED 300mmø WATERMAIN
EX. 204.0	EXISTING 200mmø WATERMAIN
EX. 297.0	EXISTING 300mmø WATERMAIN
EX. 393.0	EXISTING 400mmø WATERMAIN
J301	NODE NUMBER
●	NODE LOCATION
P10235	PIPE NUMBER
18 | 2.7 / 0.1531	NUMBER OF UNITS IN SUB AREA CAPITA PER UNITS AVERAGE DAY DEMAND (L/S)
	DESIGN AREA BOUNDARY

DRAWN	JSG
DESIGN	JSG
SCALE	N.T.S.

ATREL Engineering Ltd. Ltée
Engineers - Ingénieurs

CITY OF OTTAWA

AQUAVIEW

PLAN
WATERMAIN LAYOUT AND DEMAND

CLIENT No.	148
PROJECT No.	171203
DATE	APRIL 2018
DRAWING No.	171203-WA2

TABLE 101: NODE DATA

PROJECT: **Aquaview**
DATE: **April 2018**
CLIENT: Minto Communities Inc.
DESIGNED BY: JSG
PROJECT #: 171203
CHECKED BY: AGS
BY: Atrel Engineering Ltd

NODE. NO.	AVERAGE DAY DEMAND (l/s)	Street C.L. Elevation (m)	X COORDINATE (m)	Y COORDINATE (m)
J100	0.0875	89.28	384460.45	5035542.10
J102	0.1094	89.84	384411.12	5035657.32
J104	0.1313	90.00	384359.82	5035634.95
J106	0.1969	89.62	384324.68	5035606.86
J108	0.2625	89.51	384264.43	5035531.45
J110	0.2078	89.44	384308.32	5035468.96
J112	0.1859	89.36	384342.57	5035412.27
J114	0.0000	89.10	384386.15	5035402.29
J116	0.1750	89.60	384218.97	5035465.41
J118	0.1094	89.68	384180.15	5035408.22
J120	0.1313	89.65	384210.24	5035332.38
J122	0.1641	89.58	384244.55	5035257.54
J124	0.2516	89.50	384329.04	5035292.11
J126	0.1313	89.42	384330.02	5035357.51
J128	0.2188	89.55	384258.35	5035402.69
J130	0.1094	89.47	384283.22	5035351.63
J132	0.1422	89.69	384354.67	5035544.56
J134	0.1203	89.75	384382.82	5035488.30
J136	0.0875	89.75	384407.49	5035524.83
J138	0.1750	89.88	384385.50	5035578.34
J140	0.2479	89.35	384592.62	5035196.06
J142	0.0964	89.45	384538.15	5035205.41
J144	0.0826	89.45	384506.69	5035209.59
J146	0.0000	89.45	384531.87	5035201.59
J148	0.0000	89.19	384410.65	5035496.07

Phase 1
Phase 2

TABLE 102: PIPE DATA

DATE: **April 2018**
DESIGNED BY: JSG
CHECKED BY: AGS

PROJECT: **Aquaview**
CLIENT: Minto Communities Inc.
PROJECT #: 171203
BY: Atrel Engineering Ltd

PIPE NO.	FROM	TO	LENGTH (m)	INSIDE DIAMETER (mm)	ROUGHNESS	AVERAGE DAY DEMAND				PEAK HOUR DEMAND			
						FLOW (L/S)	VELOCITY (m/s)	HEADLOSS (m)	HL/1000 (m/km)	FLOW (L/S)	VELOCITY (m/s)	HEADLOSS (m)	HL/1000 (m/km)
P200	RES1000	J100	53.32	297	120	1.7821	0.0257	0.0002	0.0045	-7.4143	0.1070	0.0034	0.0631
P202	J100	J102	125.34	297	120	0.9077	0.0131	0.0002	0.0013	-0.1565	0.0023	0.0000	0.0001
P204	J102	J104	56.10	297	120	0.7983	0.0115	0.0001	0.0010	-0.7582	0.0109	0.0000	0.0008
P206	J104	J106	45.08	297	120	0.6299	0.0091	0.0000	0.0006	-1.3930	0.0201	0.0001	0.0029
P208	J106	J108	96.69	297	120	0.5533	0.0080	0.0001	0.0006	-1.8426	0.0266	0.0005	0.0048
P210	J108	J110	79.18	204	110	-0.0960	0.0029	0.0000	0.0002	-2.0568	0.0629	0.0034	0.0431
P212	J110	J112	67.97	204	110	-0.3038	0.0093	0.0001	0.0012	-3.1997	0.0979	0.0066	0.0976
P214	J112	J114	44.71	297	120	-1.3937	0.0201	0.0001	0.0027	-12.5518	0.1812	0.0075	0.1677
P216	J100	J148	68.84	297	120	0.7869	0.0114	0.0001	0.0009	-7.7391	0.1117	0.0047	0.0685
P218	J108	J116	80.17	297	120	0.3868	0.0056	0.0000	0.0002	-1.2295	0.0177	0.0002	0.0023
P220	J116	J118	69.44	297	120	0.1243	0.0018	0.0000	0.0000	-1.5301	0.0221	0.0002	0.0033
P222	J118	J120	81.91	297	120	0.0149	0.0002	0.0000	0.0000	-2.1318	0.0308	0.0005	0.0062
P224	J120	J122	83.52	297	120	-0.1164	0.0017	0.0000	0.0000	-2.8540	0.0412	0.0009	0.0108
P226	J122	J124	93.42	297	120	-0.2804	0.0040	0.0000	0.0002	-3.7566	0.0542	0.0017	0.0180
P228	J124	J126	66.33	297	120	-0.5320	0.0077	0.0000	0.0004	-5.1404	0.0742	0.0021	0.0320
P230	J126	J112	56.18	297	120	-0.9040	0.0130	0.0001	0.0013	-8.3296	0.1202	0.0044	0.0785
P232	J116	J128	76.41	204	110	0.0875	0.0027	0.0000	0.0001	-0.6619	0.0203	0.0004	0.0052
P234	J128	J130	57.94	204	110	-0.1313	0.0040	0.0000	0.0003	-1.8653	0.0571	0.0021	0.0360
P236	J130	J126	49.28	204	110	-0.2407	0.0074	0.0000	0.0008	-2.4669	0.0755	0.0030	0.0602
P238	J106	J132	69.64	204	110	-0.1204	0.0037	0.0000	0.0001	-0.6334	0.0194	0.0003	0.0049
P240	J132	J134	65.32	204	110	-0.2626	0.0080	0.0001	0.0010	-1.4155	0.0433	0.0014	0.0215
P242	J134	J136	46.04	204	110	0.2254	0.0069	0.0000	0.0006	1.5312	0.0468	0.0011	0.0249
P244	J136	J138	58.08	204	110	0.1379	0.0042	0.0000	0.0003	1.0499	0.0321	0.0007	0.0125
P246	J138	J104	62.30	204	110	-0.0371	0.0011	0.0000	0.0000	0.0874	0.0027	0.0000	0.0001
P248	J114	RES1002	141.95	297	120	-1.2151	0.0175	0.0003	0.0022	-23.8993	0.3450	0.0784	0.5525
P250	RES1004	J140	111.04	250	110	0.4269	0.0087	0.0001	0.0008	2.3480	0.0478	0.0023	0.0204
P252	J140	J142	58.74	250	110	0.1790	0.0036	0.0000	0.0002	0.9845	0.0201	0.0002	0.0041
P254	J142	J146	7.35	250	110	0.0416	0.0008	0.0000	0.0000	0.2287	0.0047	0.0000	0.0013
P256	J142	J144	45.86	50	110	0.0410	0.0209	0.0013	0.0288	0.2256	0.1149	0.0311	0.6777
P258	J144	J146	37.47	50	100	-0.0416	0.0212	0.0013	0.0353	-0.2287	0.1165	0.0311	0.8292
P260	J148	J114	96.93	297	120	0.1787	0.0026	0.0000	0.0001	-11.3475	0.1638	0.0135	0.1390
P262	J134	J148	22.78	204	110	-0.6082	0.0186	0.0001	0.0045	-3.6084	0.1104	0.0028	0.1221

Phase 1
Phase 2

TABLE 103: RESERVOIR DATA

DATE: **April 2018**
DESIGNED BY: JSG
CHECKED BY: AGS

PROJECT: **Aquaview**
CLIENT: Minto Communities Inc
PROJECT #: 171203
BY: Atrel Engineering Ltd

RESERVOIR NO.	X COORDINATE (m)	Y COORDINATE (m)	HEAD					LOCATION (Road intersection)
			AVERAGE DAY (m)	MAX DAY 167 (m)	MAX DAY 250 (m)	MAX DAY 283 (m)	PEAK HOUR (m)	
RES1000	384513.77	5035541.36	130.20	124.60	121.70	120.20	124.90	Place du Bois Vert
RES1002	384390.84	5035265.93	130.20	126.10	124.60	123.90	125.00	Lakepointe Drive
RES1004	384593.62	5035087.69	130.20	125.90	N/A	N/A	124.90	Louis Toscano Drive

Phase 1
Phase 2

TABLE 104: AVERAGE DAY AND PEAK HOUR DEMAND RESULTS

PROJECT: **Aquaview**
DATE: **April 2018**
CLIENT: Minto Communities Inc
DESIGNED BY: JSG
PROJECT #: 171203
CHECKED BY: AGS
BY: Atrel Engineering Ltd

NODE NO.	Street C.L. Elevation (m)	AVERAGE DAY DEMAND				PEAK HOUR DEMAND			
		Demand (l/s)	HGL (m)	Pressure (kPa)	Third Floor Pressure (kPa)	Demand (l/s)	HGL (m)	Pressure (kPa)	Third Floor Pressure (kPa)
J100	89.28	0.0875	130.20	400.98	371.55	0.4813	124.90	349.08	319.65
J102	89.84	0.1094	130.20	395.49	366.06	0.6017	124.90	343.59	314.16
J104	90.00	0.1313	130.20	393.92	364.49	0.7222	124.90	342.03	312.60
J106	89.62	0.1969	130.20	397.65	368.22	1.0830	124.90	345.75	316.32
J108	89.51	0.2625	130.20	398.72	369.29	1.4438	124.90	346.83	317.40
J110	89.44	0.2078	130.20	399.41	369.98	1.1429	124.91	347.55	318.12
J112	89.36	0.1859	130.20	400.20	370.77	1.0225	124.91	348.40	318.97
J114	89.10	0.0000	130.20	402.74	373.31	0.0000	124.92	351.02	321.59
J116	89.60	0.1750	130.20	397.84	368.41	0.9625	124.90	345.95	316.52
J118	89.68	0.1094	130.20	397.06	367.63	0.6017	124.90	345.17	315.74
J120	89.65	0.1313	130.20	397.35	367.92	0.7222	124.91	345.47	316.04
J122	89.58	0.1641	130.20	398.04	368.61	0.9026	124.91	346.17	316.74
J124	89.50	0.2516	130.20	398.82	369.39	1.3838	124.91	346.97	317.54
J126	89.42	0.1313	130.20	399.61	370.18	0.7222	124.91	347.77	318.34
J128	89.55	0.2188	130.20	398.33	368.90	1.2034	124.90	346.45	317.02
J130	89.47	0.1094	130.20	399.12	369.69	0.6017	124.91	347.25	317.82
J132	89.69	0.1422	130.20	396.96	367.53	0.7821	124.90	345.07	315.64
J134	89.75	0.1203	130.20	396.37	366.94	0.6617	124.91	344.49	315.06
J136	89.75	0.0875	130.20	396.37	366.94	0.4813	124.90	344.48	315.05
J138	89.88	0.1750	130.20	395.10	365.67	0.9625	124.90	343.20	313.77
J140	89.35	0.2479	130.20	400.30	370.87	1.3635	124.90	348.34	318.91
J142	89.45	0.0964	130.20	399.32	369.89	0.5302	124.90	347.36	317.93
J144	89.45	0.0826	130.20	399.30	369.87	0.4543	124.87	347.05	317.62
J146	89.45	0.0000	130.20	399.32	369.89	0.0000	124.90	347.36	317.93
J148	89.19	0.0000	130.20	401.86	372.43	0.0000	124.91	350.01	320.58

Phase 1
Phase 2

TABLE 105: MAXIMUM DAY PLUS FIREFLOW RESULTS

DATE: **April 2018**
DESIGNED BY: JSG
CHECKED BY: AGS

PROJECT: **Aquaview**
CLIENT: Minto Communities Inc.
PROJECT #: 171203
BY: Atrel Engineering Ltd

NODE NO.	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Available Flow @ Hydrant (L/s)	Available Flow Pressure (kPa)	Total Demand (L/s)	Available Flow @ Hydrant (L/s)	Critical NODE ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
J100	0.2188	309.72	120.89	283.00	296.99	1109.10	140.0	283.2168	1109.10	J100	140.0	103.6	1109.11	1108.55
J102	0.2735	306.54	121.12	283.00	272.82	674.08	140.0	283.2715	674.08	J102	140.0	104.1	674.09	674.09
J104	0.3283	306.02	121.23	283.00	271.39	671.17	140.0	283.3263	671.17	J104	140.0	104.3	671.18	671.18
J106	0.4923	310.42	121.30	283.00	273.86	664.10	140.0	283.4903	664.10	J106	140.0	103.9	664.11	664.11
J108	0.6563	325.14	122.69	250.00	290.06	634.17	140.0	250.6545	634.17	J108	140.0	103.8	634.17	634.17
J110	0.5195	327.03	122.81	250.00	240.38	384.58	140.0	250.5177	384.58	J110	140.0	103.7	384.58	384.58
J112	0.4648	328.91	122.93	250.00	302.19	762.78	140.0	250.4630	762.78	J112	140.0	103.6	762.78	762.78
J114	0.0000	332.24	123.00	250.00	314.17	967.65	140.0	249.9982	967.65	J114	140.0	103.4	967.66	967.66
J116	0.4375	324.79	122.74	250.00	282.75	574.02	140.0	250.4357	574.02	J116	140.0	103.9	574.02	574.02
J118	0.2735	324.22	122.77	250.00	274.03	518.35	140.0	250.2717	518.35	J118	140.0	104.0	518.35	518.35
J120	0.3283	324.78	122.79	250.00	269.98	494.54	140.0	250.3265	494.54	J120	140.0	103.9	494.54	494.54
J122	0.4103	325.74	122.82	250.00	271.17	497.87	140.0	250.4085	497.87	J122	140.0	103.9	497.87	497.87
J124	0.6290	326.85	122.85	250.00	279.37	542.13	140.0	250.6272	542.13	J124	140.0	103.8	542.13	542.13
J126	0.3283	327.87	122.88	250.00	291.18	632.03	140.0	250.3265	632.03	J126	140.0	103.7	632.03	632.03
J128	0.5470	325.78	122.80	250.00	216.90	337.34	140.0	250.5452	337.34	J128	140.0	103.8	337.34	337.34
J130	0.2735	327.00	122.84	250.00	229.78	360.70	140.0	250.2717	360.70	J130	140.0	103.8	360.70	360.70
J132	0.3555	309.64	121.29	283.00	208.13	375.83	140.0	283.3535	375.83	J132	140.0	104.0	375.83	375.83
J134	0.3008	308.97	121.28	283.00	258.87	551.59	140.0	283.2988	551.59	J134	140.0	104.0	551.60	551.60
J136	0.2188	308.82	121.26	283.00	201.96	364.14	140.0	283.2168	364.14	J136	140.0	104.0	364.14	364.14
J138	0.4375	307.37	121.25	283.00	194.65	352.27	140.0	283.4355	352.27	J138	140.0	104.2	352.27	352.27
J140	0.6198	358.16	125.90	167.00	297.59	335.30	140.0	167.6186	335.30	J144	138.9	103.6	334.42	334.24
J142	0.2410	357.18	125.90	167.00	264.78	265.69	140.0	167.2398	265.69	J144	139.9	103.7	265.65	265.42
J144	0.2065	357.10	125.89	167.00	-16941.69	15.73	140.0	167.2053	15.73	J144	140.0	103.7	15.73	15.73
J146	0.0000	357.18	125.90	167.00	260.85	259.50	140.0	166.9988	259.50	J146	140.0	103.7	259.50	259.50
J148	0.0000	326.81	122.54	250.00	309.87	927.69	140.0	249.9982	927.69	J148	140.0	103.5	927.70	927.70

Phase 1
Phase 2
Yellow shaded cell represents node which will not be subjected to fire flows

FIRE FLOW CALCULATIONS **Table 106**

CONSULTANT: ATREL ENGINEERING LTD
BY: JSG
DATE: April 2018

CLIENT: Minto Communities Inc
171203
PROJECT NAME: Aquaview

C = Coefficient related to type of construction

· wood frame	1.5	X
· ordinary construction	1.0	
· non-combustible construction	0.8	
· fire resistive construction (<2 hrs.)	0.7	
· fire resistive construction (>2 hrs.)	0.6	
· Interpolation		

A = Area of structure considered (m²)

Building No.	SINGLES	TH	B2B TH			
Location No.						
Combined gross floor area	3906	1056	1746			

(1) F = The required flow in litres per minutes (L/min)

= 220·C·(A)^½	**20624**	**10724**	**13789**	**0**	**0**	**0**

(2) Occupancy hazard reduction or surcharge (contents, L/min)

· non-combustible	- 25%						
· limited combustible	- 15%						
· combustible	- 0%	**-15**	**-15**	**-15**			
· free burning	+ 15%						
· rapid burning	+ 25%						
Required Flow (L/min)		**17530**	**9115**	**11721**	**0**	**0**	**0**

(3) Sprinkler protection reduction (entire building, % of (2), L/min)

· non-comb. - fire resistive construction with very low fire hazard (- 75%)						
· other	**0**	**0**	**0**			
Reduction (L/min)	**0**	**0**	**0**			

(4) Exposure surcharge (% of 2, L/min)

· PW(Unpierced boundary party wall)	10%	North	2.4	**25**	**4383**	16.0	**15**	**1367**	30.1	**5**	**586**			**0**			**0**			**0**
· 0 to 3.0 m	25 %																			
· 3.1 to 10.0 m	20 %	East	>45	**0**	**0**	3.2	**20**	**1823**	4.0	**20**	**2344**			**0**			**0**			**0**
· 10.1 to 20.0 m	15 %																			
· 20.1 to 30.0 m	10 %	South	2.4	**25**	**4383**	32.0	**5**	**456**	30.1	**5**	**586**			**0**			**0**			**0**
· 30.1 to 45.0 m	5 %																			
Maximum	75 %	West	14.6	**15**	**2630**	3.2	**20**	**1823**	4.0	**20**	**2344**			**0**			**0**			**0**
Exposure surcharge total				**11395**			**5469**			**5861**				**0**			**0**			**0**

(5) Fire Flow

= (2) - (3) + (4)	**28925**	**14584**	**17582**	**0**	**0**	**0**

(6) Round off fire flow (L/min) Fc

· to nearest 1,000 L/min if less than 10,000 L/min.	**29000**	**15000**	**18000**	**0**	**0**	**0**
	(483 l/s)	**(250 l/s)**	**(300 l/s)**			

(7) Available Fire Flow Ft, (L/min)

Hyd No						
Hyd flow						
From	---	---	---	---	---	---
To	**15570**	**20240**	**21136**	**0**	**0**	**0**
	(259.50 l/s)	(337.34 l/s)	(352.27 l/s)	(l/s)	(l/s)	(l/s)
Comment	**OK**	**OK**	**OK**			

As per the "Technical Bulletin ISDTB-2014-02 - Revisions to Ottawa Design Guidelines - Water", single dwellings with minimum separation of 10 meters between the backs of adjacent units may be capped to 10,000 l/min (167 l/s)

Boundary Conditions for Aquaview

Information Provided:

Date provided: March 2018

Aquaview South

Scenario	Demand	
	L/min	L/s
Average Daily Demand	39.6	0.66
Maximum Daily Demand	99	1.65
Peak Hour	218.4	3.64
Fire Flow Demand	10000	166.67

Aquaview North

Scenario	Demand	
	L/min	L/s
Average Daily Demand	180	3
Maximum Daily Demand	449.4	7.49
Peak Hour	988.8	16.48
Fire Flow Demand #1	10000	166.67
Fire Flow Demand #2	15000	250
Fire Flow Demand #3	17000	283.33

Location:


Place du Bois-Vert
Connection #1
SERRANO
SILVERADO CRES
SILVERADO CRES
BROCKSTONE CRES
AQUAVIEW DR
Lakepointe Drive
Connection #2
LAKEPOINTE DR
BONFIELD PRIV
LOUIS TOSCANO DR
Louis Toscano Drive
Connection #3
BEAUCAGE

Results:

Connection 1 - Place du Bois Vert

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.2	58.7
Peak Hour	124.9	51.1
Max Day plus Fire (10,000 l/min)	124.6	50.8
Max Day plus Fire (15,000 l/min)	121.7	46.5
Max Day plus Fire (17,000 l/min)	120.2	44.5

[1] Ground Elevation = 88.92 m

Connection 2 - Lakepointe

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.2	59.1
Peak Hour	125.0	51.6
Max Day plus Fire (10,000 l/min)	126.1	53.2
Max Day plus Fire (15,000 l/min)	124.6	51.1
Max Day plus Fire (17,000 l/min)	123.9	50.1

[1] Ground Elevation = 88.66m

Connection 3 - Louis Toscano Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.2	58.6
Peak Hour	124.9	51.1
Max Day plus Fire (10,000 l/min)	125.9	52.5

[1] Ground Elevation = 88.98m

Notes:

1) Encourage the use of firewalls to reduce the high requested fire flows to 10,000 l/min for all residential units in the Aquaview development.
2) Demonstrate that the proposed hydrant network can produce flows as high as 17,000 l/min.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

APPENDIX "E"

Table 107 - Sanitary Sewer Design Sheet – Free Flow Design Condition
171203-SANM - Macro Sanitary Drainage Area Plan

SANITARY SEWER COMPUTATION FORM

Table 107
Revision 1

DATE: **April 2018**
DESIGNED BY: VLL
CHECKED BY: AGS

PROJECT: **Aquaview**
CLIENT: Minto Developments Inc.
PROJECT #: 171203
BY: Atrel Engineering Ltd

q= 280 l/cap.day
I= 0.33 l/ha.s
PVC/CONC N= 0.013

Street	LOCATION FROM (Up)		LOCATION TO (Down)		RESIDENTIAL INDIVIDUAL AREA (ha.)	RESIDENTIAL INDIVIDUAL POP.	RESIDENTIAL CUMULATIVE AREA (ha.)	RESIDENTIAL CUMULATIVE POP.	PEAKING FACTOR M	FLOW Q(p) (L/S)	COMMERCIAL , INSTITUTIONAL INDIVIDUAL AREA (ha.)	COMMERCIAL , INSTITUTIONAL INDIVIDUAL POP.	COMMERCIAL , INSTITUTIONAL CUMULATIVE AREA (ha.)	COMMERCIAL , INSTITUTIONAL CUMULATIVE POP.	PEAKING FACTOR M	FLOW Q(p) (L/S)	PEAK EXT.FLOW Q(i) (L/S)	PEAK DES. Q(d) (L/S)	SEWER DATA TYPE PIPE	DIA. (N0M) (mm)	(ACT) (MM)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	UpStream Obv. (M)	UpStream Inv. (M)	DwnStream Obv. (M)	DwnStream Inv. (M)
Community Center	MH	Stub1	MH	11A							3.21	257.0	3.21	257	1.50	1.25	1.06	2.31	PVC	200	201.2	0.40	16.0	21.07	89%	0.66	86.75	86.55	86.69	86.49
Aquaview Drive	MH	11A	MH	11B									3.21	257	1.50	1.25	1.06	2.31	PVC	200	201.2	0.40	54.0	21.07	89%	0.66	86.63	86.43	86.41	86.21
Louis Toscano Drive	MH	10	MH	11B	3.76	589.0	3.76	589	3.94	7.51							1.24	8.75	PVC	250	251.5	0.28	53.5	31.96	73%	0.64	86.56	86.31	86.41	86.16
Street No. 5	MH	101	MH	102	0.79	34.0	0.79	34	4.00	0.44							0.26	0.70	PVC	250	251.5	0.24	31.5	29.59	98%	0.60	86.95	86.70	86.87	86.62
Street No. 5	MH	102	MH	103	0.31	17.0	1.10	51	4.00	0.66							0.36	1.02	PVC	250	251.5	0.24	54.0	29.59	97%	0.60	86.87	86.62	86.74	86.49
Street No. 5	MH	103	MH	104			1.10	51	4.00	0.66							0.36	1.02	PVC	250	251.5	0.24	11.5	29.59	97%	0.60	86.71	86.46	86.68	86.43
Street No. 5	MH	104	MH	105	0.71	51.0	1.81	102	4.00	1.32							0.60	1.92	PVC	250	251.5	0.24	68.5	29.59	94%	0.60	86.65	86.40	86.49	86.24
Street No. 5	MH	105	MH	11B	0.18	11.0	1.99	113	4.00	1.46							0.66	2.12	PVC	250	251.5	0.24	37.5	29.59	93%	0.60	86.49	86.24	86.40	86.15
Aquaview Drive	MH	11B	MH	15	0.52	39.0	6.27	741	3.88	9.32			3.21	257	1.50	1.25	3.13	13.70	PVC	375	366.4	0.15	78.0	63.84	79%	0.61	86.40	86.03	86.28	85.91
Crowberry Street	MH	14	MH	15	1.11	120.0	1.11	120	4.00	1.56							0.37	1.92	PVC	250	251.5	0.30	60.0	33.08	94%	0.67	86.47	86.22	86.29	86.04
Aquaview Drive	MH	15	MH	16	0.17	7.0	7.55	868	3.84	10.80			3.21	257	1.50	1.25	3.55	15.60	PVC	375	366.4	0.15	40.5	63.84	76%	0.61	86.28	85.91	86.22	85.85
Aquaview Drive	MH	16	MH	23	0.16	7.0	7.71	875	3.84	10.88			3.21	257	1.50	1.25	3.60	15.73	PVC	375	366.4	0.15	28.5	63.84	75%	0.61	86.22	85.85	86.18	85.81
Louis Toscano Drive	MH	22	MH	23	2.16	244.0	2.16	244	4.00	3.16	0.91	130.0	0.91	130	1.50	0.63	1.01	4.81	PVC	250	251.5	0.28	57.5	31.96	85%	0.64	86.35	86.10	86.19	85.94
Aquaview Drive	MH	23	MH	38	0.16	7.0	10.03	1126	3.77	13.74			4.12	387	1.50	1.88	4.67	20.29	PVC	375	366.4	0.15	38.5	63.84	68%	0.61	86.18	85.81	86.12	85.75
Bonfield Private	MH	37	MH	38	1.58	420.0	1.58	420	4.00	5.44							0.52	5.97	PVC	200	201.2	0.40	23.0	21.07	72%	0.66	86.12	85.92	86.03	85.83
Aquaview Drive	MH	38	MH	215	0.45	21.0	12.06	1567	3.67	18.62			4.12	387	1.50	1.88	5.34	25.84	PVC	375	366.4	0.15	103.5	63.84	60%	0.61	86.12	85.75	85.96	85.59
Aquaview Drive	MH	215	MH	216	0.11		12.17	1567	3.67	18.62			4.12	387	1.50	1.88	5.38	25.87	PVC	375	366.4	0.15	44.5	62.98	59%	0.60	85.96	85.59	85.90	85.53
Aquaview Drive	MH	216	MH	217	0.08		12.25	1567	3.67	18.62			4.12	387	1.50	1.88	5.40	25.90	PVC	375	366.4	0.15	30.0	63.84	59%	0.61	85.90	85.53	85.85	85.48
Aquaview Drive	MH	217	MH	160	0.17		12.42	1567	3.67	18.62			4.12	387	1.50	1.88	5.46	25.96	PVC	375	366.4	0.15	66.5	63.84	59%	0.61	85.85	85.48	85.75	85.38
Street No.2	MH	109	MH	110	0.36	33.0	0.36	33	4.00	0.43							0.12	0.55	PVC	200	201.2	0.32	79.0	18.93	97%	0.60	87.23	87.03	86.97	86.77
Street No.2	MH	110	MH	111	0.34	30.0	0.70	63	4.00	0.82							0.23	1.05	PVC	200	201.2	0.32	77.5	18.93	94%	0.60	86.97	86.77	86.72	86.52
Street No.2	MH	111	MH	112			0.70	63	4.00	0.82							0.23	1.05	PVC	200	201.2	0.32	11.0	18.93	94%	0.60	86.69	86.49	86.65	86.45
Street No.2	MH	112	MH	113	0.56	65.0	1.26	128	4.00	1.66							0.42	2.08	PVC	200	201.2	0.32	87.5	18.93	89%	0.60	86.62	86.42	86.34	86.14
Street No.2	MH	113	MH	114			1.26	128	4.00	1.66							0.42	2.08	PVC	200	201.2	0.32	9.5	18.93	89%	0.60	86.31	86.11	86.28	86.08
Street No.2	MH	114	MH	115	0.24	22.0	1.50	150	4.00	1.94							0.50	2.44	PVC	200	201.2	0.32	30.5	18.93	87%	0.60	86.25	86.05	86.15	85.95
Street No.2	MH	115	MH	126	0.12	11.0	1.62	161	4.00	2.09							0.53	2.62	PVC	200	201.2	0.32	29.5	18.93	86%	0.60	86.15	85.95	86.05	85.85
Street No.3	MH	122	MH	123	0.76	71.0	0.76	71	4.00	0.92							0.25	1.17	PVC	200	201.2	0.32	107.5	18.93	94%	0.60	86.70	86.50	86.35	86.15
Street No.3	MH	123	MH	124	0.19	11.0	0.95	82	4.00	1.06							0.31	1.38	PVC	200	201.2	0.32	11.0	18.93	93%	0.60	86.32	86.12	86.28	86.08
Street No.3	MH	124	MH	125	0.20	17.0	1.15	99	4.00	1.28							0.38	1.66	PVC	200	201.2	0.32	26.5	18.93	91%	0.60	86.25	86.05	86.16	85.96
Street No.3	MH	125	MH	126	0.10	9.0	1.25	108	4.00	1.40							0.41	1.81	PVC	200	201.2	0.32	21.0	18.93	90%	0.60	86.13	85.93	86.06	85.86
Street No.2	MH	126	MH	155	0.18	19.0	3.05	288	4.00	3.73							1.01	4.74	PVC	250	251.5	0.24	56.0	29.59	84%	0.60	86.05	85.80	85.92	85.67
Street No.2	MH	130	MH	131	0.28	22.0	0.28	22	4.00	0.29							0.09	0.38	PVC	200	201.2	0.65	57.5	26.86	99%	0.84	86.92	86.72	86.55	86.35
Street No.2	MH	131	MH	150	0.51	52.0	0.79	74	4.00	0.96							0.26	1.22	PVC	200	201.2	0.32	80.0	18.93	94%	0.60	86.55	86.35	86.29	86.09
Street No.2	MH	135	MH	140	0.18	17.0	0.18	17	4.00	0.22							0.06	0.28	PVC	200	201.2	0.65	34.0	26.86	99%	0.84	86.99	86.79	86.77	86.57
Street No.4	MH	136	MH	137	0.31	44.0	0.31	44	4.00	0.57							0.10	0.67	PVC	200	201.2	0.32	62.5	18.93	96%	0.60	87.23	87.03	87.03	86.83
Street No.4	MH	137	MH	140	0.25	36.0	0.56	80	4.00	1.04							0.18	1.22	PVC	200	201.2	0.32	60.5	18.93	94%	0.60	87.03	86.83	86.83	86.63
Street No.2	MH	140	MH	145	0.25	19.0	0.99	116	4.00	1.50							0.33	1.83	PVC	200	201.2	0.32	54.0	18.93	90%	0.60	86.77	86.57	86.60	86.40
Street No.4	MH	141	MH	142	0.17	6.0	0.17	6	4.00	0.08							0.06	0.13	PVC	200	201.2	0.32	11.0	18.93	99%	0.60	87.17	86.97	87.13	86.93
Street No.4	MH	142	MH	143	0.41	41.0	0.58	47	4.00	0.61							0.19	0.80	PVC	200	201.2	0.32	61.0	18.93	96%	0.60	87.10	86.90	86.90	86.70
Street No.4	MH	143	MH	144	0.30	33.0	0.88	80	4.00	1.04							0.29	1.33	PVC	200	201.2	0.32	62.5	18.93	93%	0.60	86.90	86.70	86.70	86.50
Street No.4	MH	144	MH	145			0.88	80	4.00	1.04							0.29	1.33	PVC	200	201.2	0.32	13.0	18.93	93%	0.60	86.70	86.50	86.66	86.46

SANITARY SEWER COMPUTATION FORM

Table 107
Revision 1

DATE: **April 2018**
DESIGNED BY: VLL
CHECKED BY: AGS

PROJECT: **Aquaview**
CLIENT: Minto Developments Inc.
PROJECT #: 171203
BY: Atrel Engineering Ltd

q= 280 l/cap.day
I= 0.33 l/ha.s
PVC/CONC N= 0.013

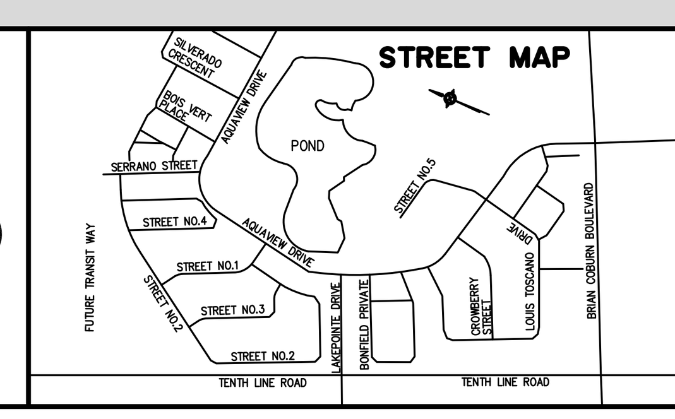
Street	LOCATION FROM (Up)		LOCATION TO (Down)		RESIDENTIAL INDIVIDUAL AREA (ha.)	RESIDENTIAL INDIVIDUAL POP.	RESIDENTIAL CUMULATIVE AREA (ha.)	RESIDENTIAL CUMULATIVE POP.	PEAKING FACTOR M	FLOW Q(p) (L/S)	COMMERCIAL , INSTITUTIONAL INDIVIDUAL AREA (ha.)	COMMERCIAL , INSTITUTIONAL INDIVIDUAL POP.	COMMERCIAL , INSTITUTIONAL CUMULATIVE AREA (ha.)	COMMERCIAL , INSTITUTIONAL CUMULATIVE POP.	PEAKING FACTOR M	FLOW Q(p) (L/S)	PEAK EXT.FLOW Q(i) (L/S)	PEAK DES. Q(d) (L/S)	SEWER DATA TYPE PIPE	DIA. (N0M) (mm)	(ACT) (MM)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	UpStream Obv. (M)	UpStream Inv. (M)	DwnStream Obv. (M)	DwnStream Inv. (M)
Street No.2	MH	145	MH	150	0.64	65.0	2.51	261	4.00	3.38							0.83	4.21	PVC	200	201.2	0.32	97.5	18.93	78%	0.60	86.60	86.40	86.29	86.09
Street No.1	MH	150	MH	151			3.30	335	4.00	4.34							1.09	5.43	PVC	250	251.5	0.24	33.5	29.59	82%	0.60	86.28	86.03	86.20	85.95
Street No.1	MH	151	MH	152	0.71	65.0	4.01	400	4.00	5.19							1.32	6.51	PVC	250	251.5	0.24	97.5	29.59	78%	0.60	86.17	85.92	85.94	85.69
Street No.1	MH	152	MH	153	0.13	11.0	4.14	411	4.00	5.33							1.37	6.69	PVC	250	251.5	0.24	18.5	29.59	77%	0.60	85.94	85.69	85.90	85.65
Street No.1	MH	153	MH	155			4.14	411	4.00	5.33							1.37	6.69	PVC	250	251.5	0.24	5.0	29.59	77%	0.60	85.87	85.62	85.86	85.61
Street No.1	MH	155	MH	160	0.14	11.0	7.33	710	3.89	8.95							2.42	11.37	PVC	250	251.5	0.24	44.5	29.59	62%	0.60	85.86	85.61	85.75	85.50
Aquaview Drive	MH	160	MH	218	0.05		19.80	2277	3.54	26.13			4.12	387	1.50	1.88	7.89	35.91	PVC	375	366.4	0.15	20.0	63.84	44%	0.61	85.75	85.38	85.72	85.35
Aquaview Drive	MH	218	MH	219	0.19		19.99	2277	3.54	26.13			4.12	387	1.50	1.88	7.96	35.97	PVC	375	366.4	0.15	71.5	63.84	44%	0.61	85.72	85.35	85.61	85.24
Future Commercial	MH	Stub2	MH	219							0.73	104.0	0.73	104	1.50	0.51	0.24	0.75	PVC	200	201.2	1.30	17.5	37.98	98%	1.19	86.27	86.07	86.04	85.84
Aquaview Drive	MH	219	MH	220	0.08		20.07	2277	3.54	26.13			4.85	491	1.50	2.39	8.22	36.74	PVC	375	366.4	0.15	31.0	63.84	42%	0.61	85.61	85.24	85.56	85.19
Aquaview Drive	MH	220	MH	222	0.10		20.17	2277	3.54	26.13			4.85	491	1.50	2.39	8.26	36.78	PVC	375	366.4	0.15	41.5	63.84	42%	0.61	85.56	85.19	85.50	85.13
Serrano Street	MH	221	MH	222	0.41	41.0	0.41	41	4.00	0.53							0.14	0.67	PVC	200	201.2	0.40	118.0	21.07	97%	0.66	85.93	85.73	85.46	85.26
Aquaview Drive	MH	222	MH	227	0.14		20.72	2318	3.54	26.56			4.85	491	1.50	2.39	8.44	37.38	PVC	375	366.4	0.15	56.5	63.84	41%	0.61	85.46	85.09	85.38	85.01

Stage 1 Sanitary sewers
Stage 1 Single Family Dwellings connected on Aquaview Drive directly
Stage 2 Sanitary Sewers

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Apr. 30, 2018
PROVINCE OF ONTARIO

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

minto



No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY
1	REVISED AS PER CITY COMMENTS	APR. 30/18	AGS

SCALE
1 : 1 250
10m 0 10 20 30 40m
HORIZONTAL

DESIGN	VLL
CHECKED	AGS
DRAWN	VLL
CHECKED	AGS
APPROVED	AGS

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Apr. 30, 2018
PROVINCE OF ONTARIO

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

CITY OF OTTAWA

AQUAVIEW

MINTO COMMUNITIES INC.

CLIENT No. 148

PROJECT No. 171203

PLAN

MACRO SANITARY DRAINAGE AREA PLAN

DRAWING No. 171203-SANM

APPENDIX "F"

Table 110 - Storm Sewer Design Sheet (2 year)
Table 111 - Storm Sewer Design Sheet (70 L/s/ha.)
171203 - STMM - Macro Storm Drainage Area Plan

STORM SEWER COMPUTATION FORM

DESIGNED BY: VLL
CHECKED BY: AGS

Aquaview
Minto Developments Inc
171203
ATREL ENGINEERING LTD
April 2018

STORM FREQUENCY : 2 YEAR
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 110
Revision 1

AREA	LOCATION FROM (Up)		TO (Down)		AREA (ha.) RUNOFF COEFFICIENT 0.40	0.45	0.52	0.55	0.60	0.65	0.70	0.75	0.80	0.85	RATIONAL METHOD INDIV. 2.78AR	ACCUM. 2.78AR	2 YEAR TIME CONC. (MIN)	RAINF. INTENS. (MM/HR)	FLOW (L/S)	ACTUAL PIPE FLOW (L/S)	PIPE SEWER DATA TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	UpStream Hgl at UP-MH (M)	UpStream Hgl Out UP-MH (M)	Down MH Hgl (M)	SURG AT UP MH (M)	Up USF ELEV (M)	HGL FREEBOARD (M)
Brian Coburn Blvd	MH	190	MH	191					0.60						1.00	1.00	10.00	76.81	76.87	76.87	PVC	375	366.4	0.27	107.0	85.65	10%	0.81	2.20	87.27	86.89	86.98	86.60	87.61	87.61	87.38	0.34	n/a	n/a
Brian Coburn Blvd	MH	191	MH	211					0.59						0.98	1.98	12.20	69.29	137.54	137.54	CONC	450	457.2	0.30	113.5	162.91	16%	0.99	1.91	86.97	86.52	86.63	86.18	87.38	87.38	87.14	0.41	n/a	n/a
Brian Coburn Blvd	MH	192	MH	193					0.34						0.57	0.57	10.00	76.81	43.56	43.56	PVC	300	299.2	0.35	82.5	56.81	23%	0.81	1.70	87.09	86.79	86.80	86.50	87.64	87.64	87.47	0.55	n/a	n/a
Brian Coburn Blvd	MH	193	MH	194					0.60						1.00	1.57	11.70	70.83	111.06	111.06	CONC	450	457.2	0.35	100.0	175.96	37%	1.07	1.55	86.80	86.35	86.45	86.00	87.47	87.47	87.33	0.67	n/a	n/a
Brian Coburn Blvd	MH	194	MH	211					0.30						0.50	2.07	13.26	66.21	136.94	136.94	CONC	450	457.2	0.32	91.5	168.25	19%	1.02	1.49	86.49	86.04	86.20	85.75	87.33	87.33	87.14	0.84	n/a	n/a
Aquaview Drive	MH	211	MH	212					0.19						0.32	4.37	14.74	62.38	272.61	272.61	CONC	600	609.6	0.20	89.5	286.47	5%	0.98	1.52	86.19	85.59	86.01	85.41	87.14	87.09	86.93	0.90	88.20	1.11
Aquaview Drive	MH	212	MH	213					0.26						0.43	4.80	16.26	58.94	283.14	283.14	CONC	675	685.8	0.20	52.0	392.18	28%	1.06	0.82	86.01	85.33	85.91	85.23	86.93	86.93	86.88	0.92	88.24	1.31
Aquaview Drive	MH	213	MH	214					0.23						0.38	5.19	17.08	57.26	297.04	297.04	CONC	675	685.8	0.20	82.5	392.18	24%	1.06	1.30	85.88	85.20	85.71	85.03	86.88	86.87	86.78	0.99	88.24	1.37
Louis Toscano Dr.	MH	201	MH	203						0.14					0.25	0.25	10.00	76.81	19.43	19.43	PVC	300	299.2	0.40	75.0	60.73	68%	0.86	1.45	87.19	86.89	86.89	86.59	87.26	87.26	87.23	0.07	87.67	0.41
Crosby Private	MH	202	MH	203	0.14						0.29				0.72	0.72	10.00	76.81	55.30	55.30	PVC	375	366.4	0.40	75.0	104.25	47%	0.99	1.26	87.14	86.77	86.84	86.47	87.31	87.31	87.23	0.17	88.20	0.89
Louis Toscano Dr.	MH	203	MH	204	0.20					0.29					0.75	1.72	11.45	71.66	123.21	123.21	CONC	450	457.2	0.20	54.0	133.02	7%	0.81	1.11	86.29	85.84	86.18	85.73	87.23	87.20	87.11	0.91	87.67	0.47
Louis Toscano Dr.	MH	204	MH	210						0.26					0.47	2.19	12.56	68.20	149.31	149.31	CONC	525	533.4	0.20	55.5	200.65	26%	0.90	1.03	86.08	85.56	85.97	85.45	87.11	87.11	87.05	1.03	87.67	0.56
Brentmore Private	MH	205	MH	206	0.22						0.14				0.52	0.52	10.00	76.81	39.72	39.72	PVC	300	299.2	0.40	41.5	60.73	35%	0.86	0.80	87.17	86.87	87.00	86.70	87.34	87.34	87.27	0.17	88.20	0.86
Brentmore Private	MH	206	MH	209							0.23				0.45	0.96	10.80	73.86	71.25	71.25	PVC	375	366.4	0.40	70.5	104.25	32%	0.99	1.19	87.00	86.63	86.72	86.35	87.27	87.26	87.13	0.26	88.20	0.94
Brentmore Private	MH	207	MH	208									0.18		0.40	0.40	10.00	76.81	30.75	30.75	PVC	300	299.2	0.40	25.5	60.73	49%	0.86	0.49	87.07	86.77	86.97	86.67	87.79	87.79	87.76	0.72	88.20	0.41
Brentmore Private	MH	208	MH	209	0.20						0.18		0.10		0.80	1.20	10.49	74.97	89.62	89.62	PVC	300	299.2	1.13	72.5	102.08	12%	1.45	0.83	86.91	86.61	86.09	85.79	87.76	87.76	87.13	0.85	88.20	0.44
Brentmore Private	MH	209	MH	210							0.15				0.29	2.45	11.99	69.93	171.47	171.47	CONC	525	533.4	0.20	52.0	200.65	15%	0.90	0.97	86.17	85.65	86.07	85.55	87.13	87.13	87.05	0.96	88.20	1.07
Louis Toscano Dr.	MH	210	MH	214						0.10					0.18	4.82	13.59	65.31	314.92	314.92	CONC	525	533.4	0.72	54.0	380.70	17%	1.70	0.53	85.77	85.25	85.38	84.86	87.05	87.05	86.78	1.28	88.24	1.19
Street No. 5	MH	801	MH	802						0.29					0.52	0.52	10.00	76.81	40.25	40.25	PVC	375	366.4	0.40	30.0	104.25	61%	0.99	0.51	86.14	85.76	86.02	85.64	86.91	86.91	86.89	0.78	87.45	0.54
Street No. 5	MH	802	MH	803				0.10		0.24					0.59	1.11	10.51	74.92	83.21	83.21	CONC	450	457.2	0.20	56.0	133.02	37%	0.81	1.15	86.02	85.57	85.91	85.46	86.89	86.89	86.85	0.88	87.40	0.51
Street No. 5	MH	803	MH	804												1.11	11.66	70.98	78.83	78.83	CONC	450	457.2	0.20	10.5	133.02	41%	0.81	0.22	85.88	85.43	85.86	85.41	86.85	86.85	86.84	0.98	87.35	0.50
Street No. 5	MH	804	MH	805				0.20		0.41					1.05	2.16	11.87	70.29	151.64	151.64	CONC	600	609.6	0.15	72.0	248.09	39%	0.85	1.41	85.86	85.26	85.75	85.15	86.84	86.84	86.80	0.98	87.35	0.51
Street No. 5	MH	805	MH	214												2.16	13.29	66.13	142.66	142.66	CONC	600	609.6	0.15	33.5	248.09	42%	0.85	0.66	85.75	85.15	85.70	85.10	86.80	86.80	86.78	1.05	87.27	0.47
Aquaview Drive	MH	214	MH	218				0.14	0.32						0.75	12.91	18.38	54.80	707.71	707.71	CONC	900	914.4	0.15	81.0	731.45	3%	1.11	1.21	85.70	84.80	85.58	84.68	86.78	86.72	86.61	1.02	87.67	0.95
Crowberry Street	MH	215	MH	216	0.39					0.44					1.23	1.23	10.00	76.81	94.38	94.38	PVC	375	366.4	0.40	78.5	104.25	9%	0.99	1.32	86.02	85.64	85.71	85.33	87.30	87.30	87.04	1.29	87.54	0.24
Crowberry Street	MH	216	MH	217												1.23	11.32	72.07	88.56	88.56	PVC	375	366.4	0.40	15.0	104.25	15%	0.99	0.25	85.68	85.30	85.62	85.24	87.04	87.03	86.99	1.35	87.47	0.44
Crowberry Street	MH	217	MH	218	0.25					0.15					0.55	1.78	11.58	71.24	126.65	126.65	PVC	375	366.4	0.91	60.5	157.24	19%	1.49	0.68	85.59	85.21	85.04	84.66	86.99	86.97	86.61	1.38	87.54	0.57
Aquaview Drive	MH	218	MH	219												14.69	19.59	52.70	774.28	774.28	CONC	975	990.6	0.15	37.0	905.48	14%	1.17	0.52	85.58	84.60	85.52	84.54	86.61	86.61	86.57	1.04	87.11	0.50
Aquaview Drive	MH	219	MH	226				0.44	0.26						1.11	15.80	20.11	51.85	819.16	819.16	CONC	975	990.6	0.15	31.0	905.48	10%	1.17	0.44	85.52	84.54	85.47	84.49	86.57	86.57	86.53	1.05	86.95	0.38
Existing Commercial	MH	Stub1	MH	220								0.91			1.90	1.90	10.00	76.81	145.74	145.74	PVC	375	366.4	0.28	8.5	87.22	-67%	0.83	0.17	86.18	85.81	86.16	85.79	87.81	87.81	87.74	1.63	n/a	n/a
Louis Toscano Dr.	MH	220	MH	221												1.90	10.17	76.15	144.48	144.48	PVC	375	366.4	0.28	8.5	87.22	-66%	0.83	0.17	86.10	85.73	86.08	85.71	87.74	87.70	87.63	1.60	87.70	
Louis Toscano Dr.	MH	221	MH	222	0.10					0.26					0.58	2.48	10.34	75.51	187.14	187.14	CONC	450	457.2	0.28	74.0	157.39	-19%	0.96	1.29	86.07	85.62	85.86	85.41	87.63	87.60	87.31	1.53	87.70	0.10
Louis Toscano Dr.	MH	222	MH	223	0.11					0.73					1.44	3.92	11.63	71.07	278.58	278.58	CONC	525	533.4	0.28	71.5	237.41	-17%	1.06	1.12	85.86	85.34	85.66	85.14	87.31	87.31	87.03	1.45	87.40	0.09
Louis Toscano Dr.	MH	223	MH	224	0.11										0.12	4.04	12.75	67.64	273.41	273.41	CONC	525	533.4	0.28	9.0	237.41	-15%	1.06	0.14	85.63	85.11	85.60	85.08	87.03	87.00	86.97	1.37	87.40	0.40
Louis Toscano Dr.	MH	224	MH	225	0.41					0.34					1.07	5.11	12.89	67.24	343.76	343.76	CONC	600	609.6	0.28	63.0	338.95	-1%	1.16	0.90	85.59	84.99	85.41	84.81	86.97	86.94	86.76	1.35	87.40	0.46
Louis Toscano Dr.	MH	225	MH	226	0.24					0.14					0.52	5.63	13.80	64.76	364.75	364.75	CONC	600	609.6	0.37	61.5	389.64	6%	1.33	0.77	85.38	84.78	85.15	84.55	86.76	86.73	86.53	1.35	87.40	0.67
Aquaview Drive	MH	226	MH	107												21.43	20.55	51.16	1096.41	1096.41	CONC	1200	1219.2	0.10	33.5	1286.19	15%	1.10	0.51	85.69	84.49	85.66	84.46	86.53	86.53	86.51	0.84	86.99	0.46
Bonfield Private	MH	101	MH	103							0.50				0.97	0.97	10.00	76.81	74.74	74.74	PVC	375	366.4	0.40	96.5	104.25	28%	0.99	1.63	86.96	86.59	86.57	86.20	87.23	87.23	87.03	0.27	88.15	0.92
Bonfield Private	MH	102	MH	103													10.00	76.81			PVC	300	299.2	0.40	21.0	60.73	100%	0.86	0.41	86.85	86.55	86.77	86.47	87.03	87.03	87.03	0.18	88.10	1.07

STORM SEWER COMPUTATION FORM

DESIGNED BY: VLL
CHECKED BY: AGS

Aquaview
Minto Developments Inc
171203
ATREL ENGINEERING LTD
April 2018

STORM FREQUENCY : 2 YEAR
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 110
Revision 1

AREA	LOCATION FROM (Up)		TO (Down)		AREA (ha.) RUNOFF COEFFICIENT 0.40	0.45	0.52	0.55	0.60	0.65	0.70	0.75	0.80	0.85	RATIONAL METHOD INDIV. 2.78AR	ACCUM. 2.78AR	2 YEAR TIME CONC. (MIN)	RAINF. INTENS. (MM/HR)	FLOW (L/S)	ACTUAL PIPE FLOW (L/S)	PIPE SEWER DATA TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	UpStream Hgl at UP-MH (M)	UpStream Hgl Out UP-MH (M)	Down MH Hgl (M)	SURG AT UP MH (M)	Up USF ELEV (M)	HGL FREEBOARD (M)
Bonfield Private	MH	103	MH	105							0.29				0.56	1.54	11.63	71.08	109.27	109.27	PVC	375	366.4	0.84	66.5	151.07	28%	1.43	0.77	86.51	86.14	85.95	85.58	87.03	86.98	86.69	0.47	87.95	0.97
Bonfield Private	MH	104	MH	105	0.23									0.27	0.89	0.89	10.00	76.81	68.65	68.65	PVC	300	299.2	1.00	83.0	96.02	29%	1.37	1.01	86.90	86.60	86.07	85.77	87.11	87.11	86.69	0.21	88.18	1.07
Bonfield Private	MH	105	MH	106					0.07						0.12	2.55	12.40	68.67	174.96	174.96	CONC	450	457.2	0.40	21.5	188.11	7%	1.15	0.31	85.94	85.49	85.85	85.40	86.69	86.69	86.62	0.75	88.15	1.46
Bonfield Private	MH	106	MH	107												2.55	12.71	67.75	172.62	172.62	CONC	450	457.2	3.27	26.5	537.85	68%	3.28	0.13	85.82	85.37	84.95	84.50	86.62	86.60	86.51	0.78	88.15	1.55
Aquaview Drive	MH	107	MH	714				0.49	0.73						1.97	25.95	21.06	50.39	1307.41	1307.41	CONC	1350	1371.6	0.10	147.0	1760.81	26%	1.19	2.06	85.81	84.46	85.66	84.31	86.51	86.51	86.43	0.70	87.95	1.44
Aquaview Drive	MH	714	MH	715					0.28						0.47	26.41	23.12	47.50	1254.61	1254.61	CONC	1350	1371.6	0.20	33.5	2490.17	50%	1.69	0.33	85.66	84.31	85.59	84.24	86.43	86.43	86.41	0.77	n/a	n/a
Aquaview Drive	MH	715	MH	860					0.22						0.37	26.78	23.45	47.07	1260.52	1260.52	CONC	1350	1371.6	0.20	61.5	2514.94	50%	1.70	0.60	85.59	84.24	85.46	84.11	86.41	86.41	86.38	0.82	n/a	n/a
Street No.2	MH	809	MH	810							0.23				0.45	0.45	10.00	76.81	34.38	34.38	PVC	300	299.2	0.40	76.0	60.73	43%	0.86	1.47	86.43	86.13	86.13	85.83	87.07	87.07	86.97	0.64	87.70	0.63
Street No.2	MH	810	MH	811							0.21				0.41	0.86	11.47	71.60	61.31	61.31	PVC	375	366.4	0.40	80.0	104.25	41%	0.99	1.35	86.13	85.76	85.81	85.44	86.97	86.97	86.86	0.84	87.65	0.68
Street No.2	MH	811	MH	812												0.86	12.82	67.46	57.76	57.76	PVC	375	366.4	0.40	11.0	104.25	45%	0.99	0.19	85.78	85.41	85.74	85.37	86.86	86.85	86.84	1.07	87.58	0.73
Street No.2	MH	812	MH	813							0.40				0.78	1.63	13.00	66.93	109.41	109.41	CONC	450	457.2	0.20	90.5	133.02	18%	0.81	1.86	85.74	85.29	85.56	85.11	86.84	86.83	86.71	1.09	87.58	0.75
Street No.2	MH	813	MH	814												1.63	14.86	62.09	101.49	101.49	CONC	450	457.2	0.20	9.0	133.02	24%	0.81	0.19	85.53	85.08	85.51	85.06	86.71	86.70	86.69	1.17	87.48	0.78
Street No.2	MH	814	MH	815							0.11				0.21	1.85	15.05	61.66	113.99	113.99	CONC	525	533.4	0.20	29.5	200.65	43%	0.90	0.55	85.51	84.99	85.45	84.93	86.69	86.68	86.66	1.17	87.48	0.80
Street No.2	MH	815	MH	826							0.08				0.16	2.00	15.59	60.40	121.06	121.06	CONC	525	533.4	0.20	29.0	200.65	40%	0.90	0.54	85.45	84.93	85.39	84.87	86.66	86.66	86.64	1.21	87.45	0.79
Street No.3	MH	822	MH	823					0.33		0.49				1.50	1.50	10.00	76.81	115.52	115.52	CONC	525	533.4	0.20	105.0	200.65	42%	0.90	1.95	85.78	85.26	85.57	85.05	86.78	86.78	86.71	1.00	87.62	0.84
Street No.3	MH	823	MH	824												1.50	11.95	70.05	105.35	105.35	CONC	525	533.4	0.20	11.0	200.65	47%	0.90	0.20	85.54	85.02	85.52	85.00	86.71	86.71	86.70	1.17	87.47	0.76
Street No.3	MH	824	MH	825					0.33		0.21				0.96	2.46	12.15	69.42	170.99	170.99	CONC	600	609.6	0.20	26.5	286.47	40%	0.98	0.45	85.52	84.92	85.47	84.87	86.70	86.69	86.67	1.17	87.47	0.78
Street No.3	MH	825	MH	826												2.46	12.60	68.07	167.66	167.66	CONC	600	609.6	0.20	22.5	286.47	41%	0.98	0.38	85.44	84.84	85.39	84.79	86.67	86.66	86.64	1.22	87.44	0.78
Street No.2	MH	826	MH	855					0.14		0.15				0.53	4.99	16.13	59.22	295.68	295.68	CONC	750	762.0	0.20	55.5	519.40	43%	1.14	0.81	85.39	84.64	85.28	84.53	86.64	86.61	86.57	1.22	87.42	0.81
Street No.2	MH	830	MH	850					0.33		0.52				1.56	1.56	10.00	76.81	120.00	120.00	CONC	525	533.4	0.20	137.5	200.65	40%	0.90	2.55	85.87	85.35	85.59	85.07	86.98	86.98	86.88	1.11	87.60	0.62
Street No.2	MH	835	MH	840					0.06		0.11				0.31	0.31	10.00	76.81	24.13	24.13	PVC	300	299.2	0.40	34.0	60.73	60%	0.86	0.66	86.04	85.74	85.90	85.60	87.11	87.11	87.09	1.07	87.68	0.57
Street No.4	MH	836	MH	837							0.30				0.58	0.58	10.00	76.81	44.84	44.84	PVC	300	299.2	0.40	64.0	60.73	26%	0.86	1.23	86.42	86.12	86.16	85.86	87.38	87.38	87.24	0.96	87.78	0.40
Street No.4	MH	837	MH	840							0.26				0.51	1.09	11.23	72.37	78.87	78.87	PVC	375	366.4	0.40	64.5	104.25	24%	0.99	1.09	86.16	85.79	85.90	85.53	87.24	87.24	87.09	1.08	87.72	0.48
Street No.2	MH	840	MH	845					0.11		0.17				0.51	1.92	12.32	68.91	132.18	132.18	CONC	525	533.4	0.20	58.0	200.65	34%	0.90	1.08	85.90	85.38	85.78	85.26	87.09	87.06	87.01	1.16	87.66	0.60
Street No.4	MH	1836	MH	841							0.07				0.14	0.14	10.00	76.81	10.46	10.46	PVC	300	299.2	0.40	47.5	60.73	83%	0.86	0.92	86.44	86.14	86.25	85.95	87.15	87.15	87.14	0.71	87.78	0.63
Street No.4	MH	841	MH	842												0.14	10.92	73.46	10.01	10.01	PVC	300	299.2	0.40	13.0	60.73	84%	0.86	0.25	86.22	85.92	86.17	85.87	87.14	87.14	87.14	0.92	87.78	0.64
Street No.4	MH	842	MH	843							0.31				0.60	0.74	11.17	72.60	53.69	53.69	PVC	375	366.4	0.40	61.0	104.25	49%	0.99	1.03	86.17	85.80	85.93	85.56	87.14	87.14	87.08	0.97	87.78	0.64
Street No.4	MH	843	MH	844							0.28				0.54	1.28	12.20	69.29	88.99	88.99	CONC	450	457.2	0.20	62.0	133.02	33%	0.81	1.28	85.93	85.48	85.81	85.36	87.08	87.08	87.02	1.15	87.72	0.64
Street No.4	MH	844	MH	845												1.28	13.47	65.63	84.29	84.29	CONC	450	457.2	0.20	16.0	133.02	37%	0.81	0.33	85.81	85.36	85.78	85.33	87.02	87.02	87.01	1.21	87.67	0.65
Street No.2	MH	845	MH	850					0.30		0.38				1.24	4.44	13.80	64.75	287.65	287.65	CONC	675	685.8	0.20	97.0	392.18	27%	1.06	1.52	85.78	85.11	85.59	84.92	87.01	86.98	86.88	1.20	87.62	0.64
Street No.1	MH	850	MH	851							0.06				0.12	6.12	15.32	61.02	373.54	373.54	CONC	750	762.0	0.20	35.0	519.40	28%	1.14	0.51	85.59	84.84	85.52	84.77	86.88	86.84	86.80	1.25	87.51	0.67
Street No.1	MH	851	MH	852					0.43		0.40				1.50	7.62	15.84	59.86	455.97	455.97	CONC	750	762.0	0.20	97.0	519.40	12%	1.14	1.42	85.49	84.74	85.30	84.55	86.80	86.78	86.63	1.29	87.48	0.70
Street No.1	MH	852	MH	853							0.10				0.19	7.81	17.25	56.91	444.57	444.57	CONC	750	762.0	0.20	19.5	519.40	14%	1.14	0.29	85.30	84.55	85.26	84.51	86.63	86.63	86.60	1.33	87.38	0.75
Street No.1	MH	853	MH	855												7.81	17.54	56.36	440.27	440.27	CONC	750	762.0	0.20	7.0	519.40	15%	1.14	0.10	85.23	84.48	85.22	84.47	86.60	86.58	86.57	1.35	87.36	0.78
Street No.1	MH	855	MH	860					0.11		0.09				0.36	13.16	17.64	56.16	739.25	739.25	CONC	750	762.0	0.65	46.5	936.36	21%	2.05	0.38	85.22	84.47	84.92	84.17	86.57	86.57	86.38	1.35	87.36	0.79
Aquaview Drive	MH	860	MH	716					0.19						0.32	40.26	24.05	46.31	1864.44	1864.44	CONC	1350	1371.6	0.20	91.0	2490.17	25%	1.69	0.90	85.46	84.11	85.28	83.93	86.38	86.38	86.28	0.92	n/a	n/a

STORM SEWER COMPUTATION FORM

DESIGNED BY: VLL
CHECKED BY: AGS

Aquaview
Minto Developments Inc
171203
ATREL ENGINEERING LTD
April 2018

STORM FREQUENCY : 2 YEAR
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 110
Revision 1

AREA	LOCATION FROM (Up)	LOCATION TO (Down)	AREA (ha.) RUNOFF COEFFICIENT 0.40	0.45	0.52	0.55	0.60	0.65	0.70	0.75	0.80	0.85	RATIONAL METHOD INDIV. 2.78AR	ACCUM. 2.78AR	2 YEAR TIME CONC. (MIN)	RAINF. INTENS. (MM/HR)	FLOW (L/S)	ACTUAL PIPE FLOW (L/S)	PIPE SEWER DATA TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	UpStream Hgl at UP-MH (M)	Hgl Out UP-MH (M)	Down MH Hgl (M)	SURG AT UP MH (M)	Up USF ELEV (M)	HGL FREEBOARD (M)
Future Commercial	MH Stub2	MH 716								0.73			1.52	1.52	10.00	76.81	116.91	116.91	PVC	375	366.4	0.40	14.0	104.25	-12%	0.99	0.24	85.34	84.97	85.28	84.91	86.35	86.35	86.28	1.01	n/a	n/a
Aquaview Drive	MH 716	MH 717												41.78	24.95	45.23	1889.80	1889.80	CONC	1350	1371.6	0.20	29.5	2490.17	24%	1.69	0.29	85.28	83.93	85.22	83.87	86.28	86.28	86.25	1.00	n/a	n/a
Aquaview Drive	MH 717	MH 719					0.19						0.32	42.10	25.24	44.89	1889.82	1889.82	CONC	1350	1371.6	0.20	41.0	2490.17	24%	1.69	0.41	85.22	83.87	85.14	83.79	86.25	86.25	86.20	1.03	n/a	n/a
Serrano Street	MH 718	MH 719					0.25		0.17				0.75	0.75	10.00	76.81	57.44	57.44	PVC	375	366.4	1.58	122.0	207.20	72%	1.96	1.03	88.07	87.70	86.14	85.77	88.07	88.07	86.20		88.7	0.63
Aquaview Drive	MH 719	MH 722					0.09						0.15	43.00	25.65	44.42	1909.92	1909.92	CONC	1500	1524.0	0.20	54.5	3297.98	42%	1.81	0.50	85.14	83.64	85.03	83.53	86.20	86.17	86.13	1.03	88.30	2.13
Bois-Vert Place	MH 726A	MH 726B	0.16						0.54				1.23	1.23	10.00	76.81	94.38	94.38	PVC	375	366.4	0.96	32.5	161.51	42%	1.53	0.35	87.52	87.15	87.21	86.84	87.52	87.52	87.21		88.75	1.23
Bois-Vert Place	MH 726B	MH 728												1.23	10.35	75.47	92.73	92.73	PVC	375	366.4	0.96	36.5	161.51	43%	1.53	0.40	87.21	86.84	86.86	86.49	87.21	87.21	86.86		88.75	1.54
Bois-Vert Place	MH 728	MH 720												1.23	10.75	74.04	90.98	90.98	PVC	375	366.4	0.96	16.5	161.51	44%	1.53	0.18	86.86	86.49	86.70	86.33	86.86	86.86	86.70		88.75	1.89
Bois-Vert Place	MH 720	MH 721						0.44					0.80	2.02	10.93	73.41	148.57	148.57	CONC	450	457.2	0.40	69.5	188.11	21%	1.15	1.01	86.61	86.16	86.33	85.88	86.66	86.61	86.35		88.05	1.44
Bois-Vert Place	MH 727	MH 729	0.07						0.23				0.53	0.53	10.00	76.81	40.36	40.36	PVC	300	299.2	0.88	57.0	90.08	55%	1.28	0.74	87.50	87.20	87.00	86.70	87.50	87.50	87.00		88.60	1.10
Bois-Vert Place	MH 729	MH 721												0.53	10.74	74.07	38.92	38.92	PVC	300	299.2	0.88	13.5	90.08	57%	1.28	0.18	87.00	86.70	86.88	86.58	87.00	87.00	86.88		88.60	1.60
Bois-Vert Place	MH 721	MH 722					0.22						0.37	2.92	11.94	70.08	204.37	204.37	CONC	450	457.2	0.50	47.5	210.32	3%	1.28	0.62	86.33	85.88	86.09	85.64	86.35	86.35	86.13	0.02	87.87	1.52
Aquaview Drive	MH 722	MH 725	0.34				0.09						0.53	46.44	26.15	43.86	2036.91	2036.91	CONC	1500	1524.0	0.20	78.0	3297.98	38%	1.81	0.72	85.03	83.53	84.87	83.37	86.13	86.13	86.07	1.10	n/a	n/a
Bois-Vert Place	MH 1720	MH 724	0.19										0.21	0.21	10.00	76.81	16.23	16.23	PVC	300	299.2	0.40	78.0	60.73	73%	0.86	1.51	87.20	86.90	86.89	86.59	87.20	87.20	86.89		87.95	0.75
Silverado Crescent	MH 723	MH 724						0.20					0.36	0.36	10.00	76.81	27.76	27.76	PVC	300	299.2	0.40	20.0	60.73	54%	0.86	0.39	87.07	86.77	86.99	86.69	87.07	87.07	86.99		88.25	1.18
Silverado Crescent	MH 724	MH 725						0.47					0.85	1.42	11.51	71.47	101.63	101.63	PVC	375	366.4	0.77	117.5	144.64	30%	1.37	1.43	86.89	86.52	85.99	85.62	86.89	86.89	86.07		87.84	0.95
Aquaview Drive	MH 725	MH G	0.47				0.30						1.02	48.89	26.87	43.09	2106.51	2106.51	CONC	1500	1524.0	0.20	82.5	3297.98	36%	1.81	0.76	84.87	83.37	84.70	83.20	86.07	86.07	86.00	1.20	n/a	n/a
Silverado Crescent	MH Ex.106	MH G	0.55	31.60	4.00			0.42					46.68	46.68	10.00	76.81	3585.84	3585.84	CONC	1500	1524.0	0.42	150.5	4779.23	25%	2.62	0.96	84.38	82.88	83.75	82.25	86.36	86.36	86.00	1.98	88.26	1.90
Aquaview Drive	MH 554	MH G		40.60			0.16	10.60					70.21	70.21	10.00	76.81	5392.96	5392.96	CONC	1800	1828.8	0.12	73.5	4154.07	-30%	1.58	0.77	83.80	82.00	83.71	81.91	86.15	86.15	86.00	2.35	n/a	n/a

Stage 1 Storm Sewers
Stage 1 and 2 Flows entering existing sewers on Aquaview Drive directly
Stage 2 Storm Sewers

STORM SEWER COMPUTATION FORM

DESIGNED BY: VLL
CHECKED BY: AGS

Aquaview
Minto Developments Inc.
171203
ATREL ENGINEERING LTD
April 2018

RESTRICTED FLOW : 70 L/S/Ha.
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 111
Revision 1

AREA	LOCATION FROM (Up)		TO (Down)		AREA (ha.) RUNOFF COEFFICIENT 0.40	0.45	0.52	0.55	0.60	0.65	0.70	0.75	0.80	0.85	Indiv 70.00 L/s/ha	Cumul 70.00 L/s/ha	FLOW (L/S)	Above ground (2) Local F.R. (L/S)	Qty	Restricted Flow (L/S)	Cum Restricted Flow (L/S)	ACTUAL PIPE FLOW (L/S)	PIPE SEWER DATA TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	UpStream Hgl at UP-MH (M)	UpStream Hgl Out UP-MH (M)	Down MH Hgl (M)	SURG AT UP MH (M)	Up USF ELEV (M)	HGL FREEBOARD (M)
Brian Coburn Blvd	MH	190	MH	191					0.60						42.00	42.00	42.00	13.40	4.00	53.60	53.60	53.60	PVC	375	366.4	0.27	107.0	85.65	37%	0.81	2.20	87.27	86.89	86.98	86.60	87.27	87.27	86.98		n/a	n/a
Brian Coburn Blvd	MH	191	MH	211					0.59						41.30	83.30	83.30	13.40	4.00	53.60	107.20	107.20	CONC	450	457.2	0.30	113.5	162.91	34%	0.99	1.91	86.97	86.52	86.63	86.18	86.97	86.97	86.79		n/a	n/a
Brian Coburn Blvd	MH	192	MH	193					0.34						23.80	23.80	23.80	13.40	2.00	26.80	26.80	26.80	PVC	300	299.2	0.35	82.5	56.81	53%	0.81	1.70	87.09	86.79	86.80	86.50	87.09	87.09	86.98		n/a	n/a
Brian Coburn Blvd	MH	193	MH	194					0.60						42.00	65.80	65.80	13.40	4.00	53.60	80.40	80.40	CONC	450	457.2	0.35	100.0	175.96	54%	1.07	1.55	86.80	86.35	86.45	86.00	86.98	86.98	86.91	0.18	n/a	n/a
Brian Coburn Blvd	MH	194	MH	211					0.30						21.00	86.80	86.80	13.40	2.00	26.80	107.20	107.20	CONC	450	457.2	0.32	91.5	168.25	36%	1.02	1.49	86.49	86.04	86.20	85.75	86.91	86.91	86.79	0.42	n/a	n/a
Aquaview Drive	MH	211	MH	212					0.19						13.30	183.40	183.40	13.40	1.00	13.40	227.80	227.80	CONC	600	609.6	0.20	89.5	286.47	20%	0.98	1.52	86.19	85.59	86.01	85.41	86.79	86.76	86.65	0.57	88.20	1.44
Aquaview Drive	MH	212	MH	213					0.26						18.20	201.60	201.60	13.40	1.00	13.40	241.20	241.20	CONC	675	685.8	0.20	52.0	392.18	38%	1.06	0.82	86.01	85.33	85.91	85.23	86.65	86.65	86.61	0.64	88.24	1.59
Aquaview Drive	MH	213	MH	214					0.23						16.10	217.70	217.70	13.40	1.00	13.40	254.60	254.60	CONC	675	685.8	0.20	82.5	392.18	35%	1.06	1.30	85.88	85.20	85.71	85.03	86.61	86.60	86.53	0.72	88.24	1.64
Louis Toscano Dr.	MH	201	MH	203						0.14					9.80	9.80	9.80	13.40	1.00	13.40	13.40	13.40	PVC	300	299.2	0.40	75.0	60.73	78%	0.86	1.45	87.19	86.89	86.89	86.59	87.19	87.19	86.89		87.67	0.48
Crosby Private	MH	202	MH	203	0.14						0.29				30.10	30.10	30.10	13.40	2.00	26.80	26.80	26.80	PVC	375	366.4	0.40	75.0	104.25	74%	0.99	1.26	87.14	86.77	86.84	86.47	87.14	87.14	86.84		88.20	1.06
Louis Toscano Dr.	MH	203	MH	204	0.20					0.29					34.30	74.20	74.20	13.40	2.00	26.80	67.00	67.00	CONC	450	457.2	0.20	54.0	133.02	50%	0.81	1.11	86.29	85.84	86.18	85.73	86.70	86.69	86.66	0.40	87.67	0.98
Louis Toscano Dr.	MH	204	MH	210						0.26					18.20	92.40	92.40	13.40	1.00	13.40	80.40	80.40	CONC	525	533.4	0.20	55.5	200.65	60%	0.90	1.03	86.08	85.56	85.97	85.45	86.66	86.66	86.64	0.58	87.67	1.01
Brentmore Private	MH	205	MH	206	0.22						0.14				25.20	25.20	25.20	13.40	2.00	26.80	26.80	26.80	PVC	300	299.2	0.40	41.5	60.73	56%	0.86	0.80	87.17	86.87	87.00	86.70	87.17	87.17	87.00		88.20	1.03
Brentmore Private	MH	206	MH	209							0.23				16.10	41.30	41.30	13.40	1.00	13.40	40.20	40.20	PVC	375	366.4	0.40	70.5	104.25	61%	0.99	1.19	87.00	86.63	86.72	86.35	87.00	87.00	86.72		88.20	1.20
Brentmore Private	MH	207	MH	208									0.18		12.60	12.60	12.60	13.40	1.00	13.40	13.40	13.40	PVC	300	299.2	0.40	25.5	60.73	78%	0.86	0.49	87.07	86.77	86.97	86.67	87.07	87.07	86.97		88.20	1.13
Brentmore Private	MH	208	MH	209	0.20						0.18		0.10		33.60	46.20	46.20	13.40	3.00	40.20	53.60	53.60	PVC	300	299.2	1.13	72.5	102.08	47%	1.45	0.83	86.91	86.61	86.09	85.79	86.91	86.91	86.67		88.20	1.29
Brentmore Private	MH	209	MH	210							0.15				10.50	98.00	98.00	13.40	1.00	13.40	107.20	107.20	CONC	525	533.4	0.20	52.0	200.65	47%	0.90	0.97	86.17	85.65	86.07	85.55	86.67	86.67	86.64	0.50	88.20	1.53
Louis Toscano Dr.	MH	210	MH	214						0.10					7.00	197.40	197.40	13.40	1.00	13.40	201.00	201.00	CONC	525	533.4	0.72	54.0	380.70	47%	1.70	0.53	85.77	85.25	85.38	84.86	86.64	86.64	86.53	0.87	88.24	1.60
Street No. 5	MH	801	MH	802						0.29					20.30	20.30	20.30	13.40	1.51	20.30	20.30	20.30	PVC	375	366.4	0.40	30.0	104.25	81%	0.99	0.51	86.14	85.76	86.02	85.64	86.56	86.56	86.56	0.42	87.45	0.89
Street No. 5	MH	802	MH	803				0.10		0.24					23.80	44.10	44.10	13.40	1.78	23.80	44.10	44.10	CONC	450	457.2	0.20	56.0	133.02	67%	0.81	1.15	86.02	85.57	85.91	85.46	86.56	86.56	86.55	0.55	87.40	0.84
Street No. 5	MH	803	MH	804												44.10	44.10	13.40			44.10	44.10	CONC	450	457.2	0.20	10.5	133.02	67%	0.81	0.22	85.88	85.43	85.86	85.41	86.55	86.55	86.55	0.67	87.35	0.80
Street No. 5	MH	804	MH	805				0.20		0.41					42.70	86.80	86.80	13.40	3.19	42.70	86.80	86.80	CONC	600	609.6	0.15	72.0	248.09	65%	0.85	1.41	85.86	85.26	85.75	85.15	86.55	86.55	86.54	0.69	87.35	0.80
Street No. 5	MH	805	MH	214												86.80	86.80	13.40			86.80	86.80	CONC	600	609.6	0.15	33.5	248.09	65%	0.85	0.66	85.75	85.15	85.70	85.10	86.54	86.54	86.53	0.79	87.27	0.73
Aquaview Drive	MH	214	MH	218				0.14	0.32						32.20	534.10	534.10	13.40	1.00	13.40	555.80	555.80	CONC	900	914.4	0.15	81.0	731.45	24%	1.11	1.21	85.70	84.80	85.58	84.68	86.53	86.49	86.42	0.79	87.67	1.18
Crowberry Street	MH	215	MH	216	0.39					0.44					58.10	58.10	58.10	13.40	2.00	26.80	26.80	26.80	PVC	375	366.4	0.40	78.5	104.25	74%	0.99	1.32	86.02	85.64	85.71	85.33	86.50	86.50	86.48	0.48	87.54	1.04
Crowberry Street	MH	216	MH	217												58.10	58.10	13.40			26.80	26.80	PVC	375	366.4	0.40	15.0	104.25	74%	0.99	0.25	85.68	85.30	85.62	85.24	86.48	86.48	86.48	0.80	87.47	0.99
Crowberry Street	MH	217	MH	218	0.25					0.15					28.00	86.10	86.10	13.40	2.00	26.80	53.60	53.60	PVC	375	366.4	0.91	60.5	157.24	66%	1.49	0.68	85.59	85.21	85.04	84.66	86.48	86.48	86.42	0.89	87.54	1.06
Aquaview Drive	MH	218	MH	219												620.20	620.20	13.40			609.40	609.40	CONC	975	990.6	0.15	37.0	905.48	33%	1.17	0.52	85.58	84.60	85.52	84.54	86.42	86.42	86.39	0.84	87.11	0.69
Aquaview Drive	MH	219	MH	226				0.44	0.26						49.00	669.20	669.20	13.40	1.00	13.40	622.80	622.80	CONC	975	990.6	0.15	31.0	905.48	31%	1.17	0.44	85.52	84.54	85.47	84.49	86.39	86.39	86.37	0.87	86.95	0.56
Existing Commercia	MH	Stub1	MH	220								0.91			63.70	63.70	63.70	13.40	4.75	63.70	63.70	63.70	PVC	375	366.4	0.28	8.5	87.22	27%	0.83	0.17	86.18	85.81	86.16	85.79	86.72	86.72	86.71	0.54	n/a	n/a
Louis Toscano Dr.	MH	220	MH	221												63.70	63.70	13.40			63.70	63.70	PVC	375	366.4	0.28	8.5	87.22	27%	0.83	0.17	86.10	85.73	86.08	85.71	86.71	86.70	86.69	0.60	87.70	1.00
Louis Toscano Dr.	MH	221	MH	222	0.10					0.26					25.20	88.90	88.90	13.40	2.00	26.80	90.50	90.50	CONC	450	457.2	0.28	74.0	157.39	42%	0.96	1.29	86.07	85.62	85.86	85.41	86.69	86.68	86.61	0.61	87.70	1.02
Louis Toscano Dr.	MH	222	MH	223	0.11					0.73					58.80	147.70	147.70	13.40	3.00	40.20	130.70	130.70	CONC	525	533.4	0.28	71.5	237.41	45%	1.06	1.12	85.86	85.34	85.66	85.14	86.61	86.61	86.55	0.75	87.40	0.79
Louis Toscano Dr.	MH	223	MH	224	0.11										7.70	155.40	155.40	13.40	1.00	13.40	144.10	144.10	CONC	525	533.4	0.28	9.0	237.41	39%	1.06	0.14	85.63	85.11	85.60	85.08	86.55	86.54	86.53	0.91	87.40	0.86
Louis Toscano Dr.	MH	224	MH	225	0.41					0.34					52.50	207.90	207.90	13.40	4.00	53.60	197.70	197.70	CONC	600	609.6	0.28	63.0	338.95	42%	1.16	0.90	85.59	84.99	85.41	84.81	86.53	86.52	86.46	0.93	87.40	0.88
Louis Toscano Dr.	MH	225	MH	226	0.24					0.14					26.60	234.50	234.50	13.40	2.00	26.80	224.50	224.50	CONC	600	609.6	0.37	61.5	389.64	42%	1.33	0.77	85.38	84.78	85.15	84.55	86.46	86.45	86.37	1.07	87.40	0.95
Aquaview Drive	MH	226	MH	107												903.70	903.70	13.40			847.30	847.30	CONC	1200	1219.2	0.10	33.5	1286.19	34%	1.10	0.51	85.69	84.49	85.66	84.46	86.37	86.37	86.36	0.68	86.99	0.62
Bonfield Private	MH	101	MH	103							0.50				35.00	35.00	35.00	13.40	2.00	26.80	26.80	26.80	PVC	375	366.4	0.40	96.5	104.25	74%	0.99	1.63	86.96	86.59	86.57	86.20	86.96	86.96	86.57		88.15	1.19
Bonfield Private	MH	102	MH	103														13.40					PVC	300	299.2	0.40	21.0	60.73	100%	0.86	0.41	86.85	86.55	86.77	86.47	86.85	86.85	86.77		88.10	1.25

STORM SEWER COMPUTATION FORM

DESIGNED BY: VLL
CHECKED BY: AGS

Aquaview
Minto Developments Inc.
171203
ATREL ENGINEERING LTD
April 2018

RESTRICTED FLOW : 70 L/S/Ha.
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 111
Revision 1

AREA	LOCATION FROM (Up)		TO (Down)		AREA (ha.) RUNOFF COEFFICIENT 0.40	0.45	0.52	0.55	0.60	0.65	0.70	0.75	0.80	0.85	Above ground: Indiv 70.00 L/s/ha	Cumul 70.00 L/s/ha	FLOW (L/S)	(2) Local F.R. (L/S)	Qty	Restricted Flow (L/S)	Cum Restricted Flow (L/S)	ACTUAL PIPE FLOW (L/S)	PIPE SEWER DATA: TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	UpStream Hgl at UP-MH (M)	UpStream Hgl Out UP-MH (M)	Down MH Hgl (M)	SURG AT UP MH (M)	Up USF ELEV (M)	HGL FREEBOARD (M)
Bonfield Private	MH	103	MH	105							0.29				20.30	55.30	55.30	13.40	2.00	26.80	53.60	53.60	PVC	375	366.4	0.84	66.5	151.07	65%	1.43	0.77	86.51	86.14	85.95	85.58	86.52	86.51	86.42		87.95	1.44
Bonfield Private	MH	104	MH	105	0.23									0.27	35.00	35.00	35.00	13.40	2.00	26.80	26.80	26.80	PVC	300	299.2	1.00	83.0	96.02	72%	1.37	1.01	86.90	86.60	86.07	85.77	86.90	86.90	86.42		88.18	1.28
Bonfield Private	MH	105	MH	106					0.07						4.90	95.20	95.20	13.40	1.00	13.40	93.80	93.80	CONC	450	457.2	0.40	21.5	188.11	50%	1.15	0.31	85.94	85.49	85.85	85.40	86.42	86.42	86.40	0.48	88.15	1.73
Bonfield Private	MH	106	MH	107												95.20	95.20	13.40			93.80	93.80	CONC	450	457.2	3.27	26.5	537.85	83%	3.28	0.13	85.82	85.37	84.95	84.50	86.40	86.39	86.36	0.57	88.15	1.76
Aquaview Drive	MH	107	MH	714				0.49	0.73						85.40	1084.30	1084.30	13.40	3.00	40.20	981.30	981.30	CONC	1350	1371.6	0.10	147.0	1760.81	44%	1.19	2.06	85.81	84.46	85.66	84.31	86.36	86.36	86.31	0.55	87.95	1.59
Aquaview Drive	MH	714	MH	715					0.28						19.60	1103.90	1103.90	13.40	2.00	26.80	1008.10	1008.10	CONC	1350	1371.6	0.20	33.5	2490.17	60%	1.69	0.33	85.66	84.31	85.59	84.24	86.31	86.31	86.30	0.65	n/a	n/a
Aquaview Drive	MH	715	MH	860					0.22						15.40	1119.30	1119.30	13.40	2.00	26.80	1034.90	1034.90	CONC	1350	1371.6	0.20	61.5	2514.94	59%	1.70	0.60	85.59	84.24	85.46	84.11	86.30	86.30	86.28	0.71	n/a	n/a
Street No.2	MH	809	MH	810							0.23				16.10	16.10	16.10	13.40	1.20	16.10	16.10	16.10	PVC	300	299.2	0.40	76.0	60.73	73%	0.86	1.47	86.43	86.13	86.13	85.83	86.49	86.49	86.47	0.06	87.70	1.21
Street No.2	MH	810	MH	811							0.21				14.70	30.80	30.80	13.40	1.10	14.70	30.80	30.80	PVC	375	366.4	0.40	80.0	104.25	70%	0.99	1.35	86.13	85.76	85.81	85.44	86.47	86.47	86.44	0.34	87.65	1.18
Street No.2	MH	811	MH	812												30.80	30.80	13.40			30.80	30.80	PVC	375	366.4	0.40	11.0	104.25	70%	0.99	0.19	85.78	85.41	85.74	85.37	86.44	86.44	86.44	0.66	87.58	1.14
Street No.2	MH	812	MH	813							0.40				28.00	58.80	58.80	13.40	2.09	28.00	58.80	58.80	CONC	450	457.2	0.20	90.5	133.02	56%	0.81	1.86	85.74	85.29	85.56	85.11	86.44	86.44	86.40	0.70	87.58	1.14
Street No.2	MH	813	MH	814												58.80	58.80	13.40			58.80	58.80	CONC	450	457.2	0.20	9.0	133.02	56%	0.81	0.19	85.53	85.08	85.51	85.06	86.40	86.40	86.40	0.87	87.48	1.08
Street No.2	MH	814	MH	815							0.11				7.70	66.50	66.50	13.40	0.57	7.70	66.50	66.50	CONC	525	533.4	0.20	29.5	200.65	67%	0.90	0.55	85.51	84.99	85.45	84.93	86.40	86.40	86.39	0.89	87.48	1.08
Street No.2	MH	815	MH	826							0.08				5.60	72.10	72.10	13.40	0.42	5.60	72.10	72.10	CONC	525	533.4	0.20	29.0	200.65	64%	0.90	0.54	85.45	84.93	85.39	84.87	86.39	86.39	86.38	0.94	87.45	1.06
Street No.3	MH	822	MH	823					0.33		0.49				57.40	57.40	57.40	13.40	4.28	57.40	57.40	57.40	CONC	525	533.4	0.20	105.0	200.65	71%	0.90	1.95	85.78	85.26	85.57	85.05	86.41	86.41	86.39	0.63	87.62	1.21
Street No.3	MH	823	MH	824												57.40	57.40	13.40			57.40	57.40	CONC	525	533.4	0.20	11.0	200.65	71%	0.90	0.20	85.54	85.02	85.52	85.00	86.39	86.39	86.39	0.85	87.47	1.08
Street No.3	MH	824	MH	825					0.33		0.21				37.80	95.20	95.20	13.40	2.82	37.80	95.20	95.20	CONC	600	609.6	0.20	26.5	286.47	67%	0.98	0.45	85.52	84.92	85.47	84.87	86.39	86.39	86.38	0.87	87.47	1.08
Street No.3	MH	825	MH	826												95.20	95.20	13.40			95.20	95.20	CONC	600	609.6	0.20	22.5	286.47	67%	0.98	0.38	85.44	84.84	85.39	84.79	86.38	86.38	86.38	0.94	87.44	1.06
Street No.2	MH	826	MH	855					0.14		0.15				20.30	187.60	187.60	13.40	1.51	20.30	187.60	187.60	CONC	750	762.0	0.20	55.5	519.40	64%	1.14	0.81	85.39	84.64	85.28	84.53	86.38	86.37	86.36	0.98	87.42	1.05
Street No.2	MH	830	MH	850					0.33		0.52				59.50	59.50	59.50	13.40	4.44	59.50	59.50	59.50	CONC	525	533.4	0.20	137.5	200.65	70%	0.90	2.55	85.87	85.35	85.59	85.07	86.50	86.50	86.48	0.63	87.60	1.10
Street No.2	MH	835	MH	840					0.06		0.11				11.90	11.90	11.90	13.40	0.89	11.90	11.90	11.90	PVC	300	299.2	0.40	34.0	60.73	80%	0.86	0.66	86.04	85.74	85.90	85.60	86.55	86.55	86.54	0.51	87.68	1.13
Street No.4	MH	836	MH	837							0.30				21.00	21.00	21.00	13.40	1.57	21.00	21.00	21.00	PVC	300	299.2	0.40	64.0	60.73	65%	0.86	1.23	86.42	86.12	86.16	85.86	86.61	86.61	86.58	0.19	87.78	1.17
Street No.4	MH	837	MH	840							0.26				18.20	39.20	39.20	13.40	1.36	18.20	39.20	39.20	PVC	375	366.4	0.40	64.5	104.25	62%	0.99	1.09	86.16	85.79	85.90	85.53	86.58	86.58	86.54	0.42	87.72	1.14
Street No.2	MH	840	MH	845					0.11		0.17				19.60	70.70	70.70	13.40	1.46	19.60	70.70	70.70	CONC	525	533.4	0.20	58.0	200.65	65%	0.90	1.08	85.90	85.38	85.78	85.26	86.54	86.53	86.52	0.63	87.66	1.13
Street No.4	MH	1836	MH	841							0.07				4.90	4.90	4.90	13.40	0.37	4.90	4.90	4.90	PVC	300	299.2	0.40	47.5	60.73	92%	0.86	0.92	86.44	86.14	86.25	85.95	86.55	86.55	86.55	0.11	87.78	1.23
Street No.4	MH	841	MH	842												4.90	4.90	13.40			4.90	4.90	PVC	300	299.2	0.40	13.0	60.73	92%	0.86	0.25	86.22	85.92	86.17	85.87	86.55	86.55	86.55	0.33	87.78	1.23
Street No.4	MH	842	MH	843							0.31				21.70	26.60	26.60	13.40	1.62	21.70	26.60	26.60	PVC	375	366.4	0.40	61.0	104.25	74%	0.99	1.03	86.17	85.80	85.93	85.56	86.55	86.55	86.53	0.38	87.78	1.23
Street No.4	MH	843	MH	844							0.28				19.60	46.20	46.20	13.40	1.46	19.60	46.20	46.20	CONC	450	457.2	0.20	62.0	133.02	65%	0.81	1.28	85.93	85.48	85.81	85.36	86.53	86.53	86.52	0.60	87.72	1.19
Street No.4	MH	844	MH	845												46.20	46.20	13.40			46.20	46.20	CONC	450	457.2	0.20	16.0	133.02	65%	0.81	0.33	85.81	85.36	85.78	85.33	86.52	86.52	86.52	0.71	87.67	1.15
Street No.2	MH	845	MH	850					0.30		0.38				47.60	164.50	164.50	13.40	3.55	47.60	164.50	164.50	CONC	675	685.8	0.20	97.0	392.18	58%	1.06	1.52	85.78	85.11	85.59	84.92	86.52	86.51	86.48	0.73	87.62	1.11
Street No.1	MH	850	MH	851							0.06				4.20	228.20	228.20	13.40	0.31	4.20	228.20	228.20	CONC	750	762.0	0.20	35.0	519.40	56%	1.14	0.51	85.59	84.84	85.52	84.77	86.48	86.46	86.45	0.87	87.51	1.05
Street No.1	MH	851	MH	852					0.43		0.40				58.10	286.30	286.30	13.40	4.34	58.10	286.30	286.30	CONC	750	762.0	0.20	97.0	519.40	45%	1.14	1.42	85.49	84.74	85.30	84.55	86.45	86.44	86.38	0.95	87.48	1.04
Street No.1	MH	852	MH	853							0.10				7.00	293.30	293.30	13.40	0.52	7.00	293.30	293.30	CONC	750	762.0	0.20	19.5	519.40	44%	1.14	0.29	85.30	84.55	85.26	84.51	86.38	86.38	86.37	1.08	87.38	1.00
Street No.1	MH	853	MH	855												293.30	293.30	13.40			293.30	293.30	CONC	750	762.0	0.20	7.0	519.40	44%	1.14	0.10	85.23	84.48	85.22	84.47	86.37	86.36	86.36	1.13	87.36	1.00
Street No.1	MH	855	MH	860					0.11		0.09				14.00	494.90	494.90	13.40	1.04	14.00	494.90	494.90	CONC	750	762.0	0.65	46.5	936.36	47%	2.05	0.38	85.22	84.47	84.92	84.17	86.36	86.36	86.28	1.14	87.36	1.00
Aquaview Drive	MH	860	MH	716					0.19						13.30	1627.50	1627.50	13.40	2.00	26.80	1556.60	1556.60	CONC	1350	1371.6	0.20	91.0	2490.17	37%	1.69	0.90	85.46	84.11	85.28	83.93	86.28	86.28	86.21	0.82	n/a	n/a

STORM SEWER COMPUTATION FORM

DESIGNED BY: VLL
CHECKED BY: AGS

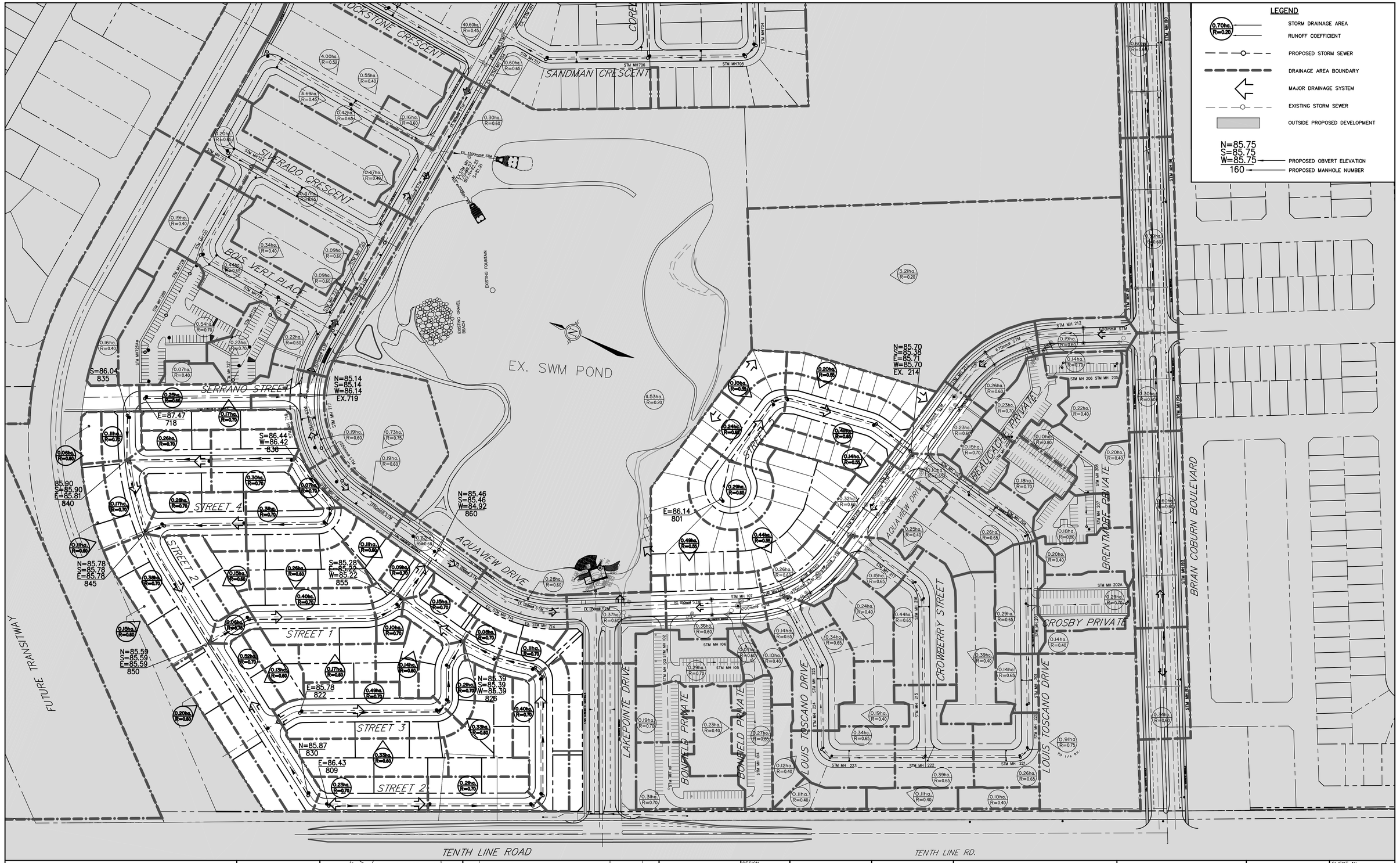
Aquaview
Minto Developments Inc.
171203
ATREL ENGINEERING LTD
April 2018

RESTRICTED FLOW : 70 L/S/Ha.
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 111
Revision 1

AREA	LOCATION FROM (Up)		TO (Down)		AREA (ha.) RUNOFF COEFFICIENT 0.40	0.45	0.52	0.55	0.60	0.65	0.70	0.75	0.80	0.85	Indiv 70.00 L/s/ha	Cumul 70.00 L/s/ha	FLOW (L/S)	Above ground (2) Local F.R. (L/S)	Qty	Restricted Flow (L/S)	Cum Restricted Flow (L/S)	ACTUAL PIPE FLOW (L/S)	PIPE SEWER DATA TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	UpStream Hgl at UP-MH (M)	UpStream Hgl Out UP-MH (M)	Down MH Hgl (M)	SURG AT UP MH (M)	Up USF ELEV (M)	HGL FREEBOARD (M)
Future Commercial	MH	Stub2	MH	716								0.73			51.10	51.10	51.10	13.40	0.99	13.30	13.30	13.30	PVC	375	366.4	0.40	14.0	104.25	87%	0.99	0.24	85.34	84.97	85.28	84.91	86.21	86.21	86.21	0.87	n/a	n/a
Aquaview Drive	MH	716	MH	717												1678.60	1678.60	13.40	2.19	29.40	1599.30	1599.30	CONC	1350	1371.6	0.20	29.5	2490.17	36%	1.69	0.29	85.28	83.93	85.22	83.87	86.21	86.21	86.19	0.93	n/a	n/a
Aquaview Drive	MH	717	MH	719					0.19						13.30	1691.90	1691.90	13.40	2.00	26.80	1626.10	1626.10	CONC	1350	1371.6	0.20	41.0	2490.17	35%	1.69	0.41	85.22	83.87	85.14	83.79	86.19	86.19	86.16	0.97	n/a	n/a
Serrano Street	MH	718	MH	719					0.25		0.17				29.40	29.40	29.40	13.40	2.00	26.80	26.80	26.80	PVC	375	366.4	1.58	122.0	207.20	87%	1.96	1.03	88.07	87.70	86.14	85.77	88.07	88.07	86.16		88.7	0.63
Aquaview Drive	MH	719	MH	722					0.09						6.30	1727.60	1727.60	13.40	1.00	13.40	1666.30	1666.30	CONC	1500	1524.0	0.20	54.5	3297.98	49%	1.81	0.50	85.14	83.64	85.03	83.53	86.16	86.14	86.11	1.00	88.30	2.16
Bois-Vert Place	MH	726A	MH	726B	0.16						0.54				49.00	49.00	49.00	13.40	4.00	53.60	53.60	53.60	PVC	375	366.4	0.96	32.5	161.51	67%	1.53	0.35	87.52	87.15	87.21	86.84	87.52	87.52	87.21		88.75	1.23
Bois-Vert Place	MH	726B	MH	728												49.00	49.00	13.40			53.60	53.60	PVC	375	366.4	0.96	36.5	161.51	67%	1.53	0.40	87.21	86.84	86.86	86.49	87.21	87.21	86.86		88.75	1.54
Bois-Vert Place	MH	728	MH	720												49.00	49.00	13.40			53.60	53.60	PVC	375	366.4	0.96	16.5	161.51	67%	1.53	0.18	86.86	86.49	86.70	86.33	86.86	86.86	86.70		88.75	1.89
Bois-Vert Place	MH	720	MH	721						0.44					30.80	79.80	79.80	13.40	2.00	26.80	80.40	80.40	CONC	450	457.2	0.40	69.5	188.11	57%	1.15	1.01	86.61	86.16	86.33	85.88	86.63	86.61	86.33		88.05	1.44
Bois-Vert Place	MH	727	MH	729	0.07						0.23				21.00	21.00	21.00	13.40	3.00	40.20	40.20	40.20	PVC	300	299.2	0.88	57.0	90.08	55%	1.28	0.74	87.50	87.20	87.00	86.70	87.50	87.50	87.00		88.60	1.10
Bois-Vert Place	MH	729	MH	721												21.00	21.00	13.40			40.20	40.20	PVC	300	299.2	0.88	13.5	90.08	55%	1.28	0.18	87.00	86.70	86.88	86.58	87.00	87.00	86.88		88.60	1.60
Bois-Vert Place	MH	721	MH	722					0.22						15.40	116.20	116.20	13.40	2.00	26.80	147.40	147.40	CONC	450	457.2	0.50	47.5	210.32	30%	1.28	0.62	86.33	85.88	86.09	85.64	86.33	86.33	86.11		87.87	1.54
Aquaview Drive	MH	722	MH	725	0.34				0.09						30.10	1873.90	1873.90	13.40	2.00	26.80	1840.50	1840.50	CONC	1500	1524.0	0.20	78.0	3297.98	44%	1.81	0.72	85.03	83.53	84.87	83.37	86.11	86.11	86.06	1.08	n/a	n/a
Bois-Vert Place	MH	1720	MH	724	0.19										13.30	13.30	13.30	13.40	1.00	13.40	13.40	13.40	PVC	300	299.2	0.40	78.0	60.73	78%	0.86	1.51	87.20	86.90	86.89	86.59	87.20	87.20	86.89		87.95	0.75
Silverado Crescent	MH	723	MH	724						0.20					14.00	14.00	14.00	13.40	1.00	13.40	13.40	13.40	PVC	300	299.2	0.40	20.0	60.73	78%	0.86	0.39	87.07	86.77	86.99	86.69	87.07	87.07	86.99		88.25	1.18
Silverado Crescent	MH	724	MH	725						0.47					32.90	60.20	60.20	13.40	4.00	53.60	80.40	80.40	PVC	375	366.4	0.77	117.5	144.64	44%	1.37	1.43	86.89	86.52	85.99	85.62	86.89	86.89	86.06		87.84	0.95
Aquaview Drive	MH	725	MH	G	0.47				0.30						53.90	1988.00	1988.00	13.40	3.00	40.20	1961.10	1961.10	CONC	1500	1524.0	0.20	82.5	3297.98	41%	1.81	0.76	84.87	83.37	84.70	83.20	86.06	86.06	86.00	1.19	n/a	n/a
Silverado Crescent	MH	Ex.106	MH	G	0.55	31.60	4.00			0.42					2559.90	2559.90	2559.90	13.40	167.67	2246.80	2246.80	2246.80	CONC	1500	1524.0	0.42	150.5	4779.23	53%	2.62	0.96	84.38	82.88	83.75	82.25	86.14	86.14	86.00	1.76	88.26	2.12
Aquaview Drive	MH	554	MH	G		40.60			0.16	10.60					3595.20	3595.20	3595.20	13.40	268.46	3597.40	3597.40	3597.40	CONC	1800	1828.8	0.12	73.5	4154.07	13%	1.58	0.77	83.80	82.00	83.71	81.91	86.07	86.07	86.00	2.27	n/a	n/a

Stage 1 Storm Sewers
Stage 1 and 2 Flows entering existing sewers on Aquaview Drive directly
Stage 2 Storm Sewers



THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

STREET MAP

No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY
1	REVISED AS PER CITY COMMENTS	APR. 30/18	AGS

SCALE
1 : 1 250
10m 0 10 20 30 40m
HORIZONTAL

DESIGN	VLL
CHECKED	AGS
DRAWN	VLL
CHECKED	AGS
APPROVED	AGS

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Apr. 30, 2018
PROVINCE OF ONTARIO

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Engineers - Ingénieurs
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CITY OF OTTAWA
AQUAVIEW

MINTO COMMUNITIES INC.

CLIENT No. 148
PROJECT No. 171203

PLAN MACRO STORM DRAINAGE AREA PLAN

DRAWING No. 171203-STMM

APPENDIX "G"

Development Servicing Study Checklist

Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

	4.1 General Content	Section	Comments
	Executive Summary (for larger reports only).	N/A	
	Date and revision number of the report.		Cover Page
	Location map and plan showing municipal address, boundary, and layout of proposed development.	1.1 App.“A”	Figure 1, SK-1
	Plan showing the site and location of all existing services.	App.“C” App.“D” App.“E”	Drawing 171203-STMM, 171203-SANM, 171203-WA1 and 171203-WA2
	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	1.2	Cumming Cockburn Limited report titled “SWM Plan Neighbourhood 2 – Upper Billberry Creek Watershed – East Urban Community Exapansion Area – February 2000”
	Summary of Pre-consultation Meetings with City and other approval agencies.	1.6	
	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	1.2	Cumming Cockburn Limited report titled “SWM Plan Neighbourhood 2 – Upper Billberry Creek Watershed – East Urban Community Exapansion Area – February 2000” Atrel’s report titled “Design Brief - Stage 1 – Sewer Outlets and Master Plans – Revision 2”
	Statement of objectives and servicing criteria.	1.1	
	Identification of existing and proposed infrastructure available in the immediate area.	1.3	Atrel’s Drawings
	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	2.6	Cumming Cockburn Limited report titled “SWM Plan Neighbourhood 2 – Upper Billberry Creek Watershed – East Urban Community Exapansion Area – February 2000”
	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	2.1	
	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A	
	Proposed phasing of the development, if applicable.	N/A	
	Reference to geotechnical studies and recommendations concerning servicing.	2.1	Paterson Group Geotechnical Investigation

	All preliminary and formal site plan submissions should have the following information:		App.“B” App.“C” App.“D” App.“E”	Atrel’s Drawings
	X	Metric scale		
	X	North arrow (including construction North)		
	X	Key plan		
	X	Name and contact information of applicant and property owner		
	X	Property limits including bearings and dimensions		By OLS
	X	Existing and proposed structures and parking areas		
	X	Easements, road widening and rights-of-way		
	X	Adjacent street name		

	4.2 Development Servicing Report: Water	**Section**	**Comments**
	Confirm consistency with Master Servicing Study, if applicable.	1.2	
	Availability of public infrastructure to service proposed development	1.3	
	Identification of system constraints	2.3	
	Identify boundary conditions	2.3	
	Confirmation of adequate domestic supply and pressure	2.3	
	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter’s Survey. Output should show available fire flow at locations throughout the development.	2.3.1	
	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	2.3	
	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	2.3	
	Address reliability requirements such as appropriate location of shut-off valves	2.3	
	Check on the necessity of a pressure zone boundary modification.	N/A	
	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	2.3	
	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	2.3 App.“C”	
	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A	
	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	2.3	
	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	2.3 App.“C”	

	4.3 Development Servicing Report: Wastewater	Section	Comments
	Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	2.4	
	Confirm consistency with Master Servicing Study and/or justifications for deviations.	2.4	
	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A	
	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	1.3 & 2.4	
	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	2.4	
	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	2.4 App."D"	
	Description of proposed sewer network including sewers, pumping stations, and forcemains.	2.4 App."D"	Atrel's Drawings
	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A	
	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	2.4	
	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A	
	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	2.5	
	Special considerations such as contamination, corrosive environment etc.	N/A	

	4.4 Development Servicing Report: Stormwater	Section	Comments
	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	2.6	Cumming Cockburn Limited report titled "SWM Plan Neighbourhood 2 – Upper Billberry Creek Watershed – East Urban Community Exapansion Area – February 2000"
	Analysis of available capacity in existing public infrastructure.	2.6	
	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	App."E"	171203-STMM
	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	2.6	SWM is existing.
	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	2.6	
	Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	2.6	

	Set-back from private sewage disposal systems.	N/A	
	Watercourse and hazard lands setbacks.	N/A	
	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A	
	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	2.6	
	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	2.6	Cumming Cockburn Limited report titled "SWM Plan Neighbourhood 2 – Upper Billberry Creek Watershed – East Urban Community Exapansion Area – February 2000
	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A	
	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	N/A	Cumming Cockburn Limited report titled "SWM Plan Neighbourhood 2 – Upper Billberry Creek Watershed – East Urban Community Exapansion Area – February 2000
	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A	
	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	2.6 App."E"	
	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100 year return period storm event.	N/A	
	Identification of potential impacts to receiving watercourses	N/A	
	Identification of municipal drains and related approval requirements.	N/A	
	Descriptions of how the conveyance and storage capacity will be achieved for the development.	2.6	
	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	2.6	
	Inclusion of hydraulic analysis including hydraulic grade line elevations.	2.6 & App."F"	
	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	2.2	
	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A	
	Identification of fill constraints related to floodplain and geotechnical investigation.	2.1	Paterson Group Geotechnical Investigation

	4.5 Approval and Permit Requirements	Section	Comments
The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:			
	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	1.5	
	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	1.5	Will be submitted later
	Changes to Municipal Drains.	N/A	
	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A	

	4.6 Conclusion	Section	Comments
	Clearly stated conclusions and recommendations	3.0	
	Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.		
	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	3.0	

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following: