

CHÂTEAUX DU VILLAGE – STAGE 2

Serviceability Study



PROJECT No.: 120301

**LOT 29
BROKEN FRONT CONCESSION
&
LOT 29 AND
WEST HALF OF LOT 28
CONCESSION 1**

TOWNSHIP OF ALFRED-PLANTAGENET

OCTOBER 2020

**GRADING, WATERMAIN,
STORM AND SANITARY SEWERS**

SERVICEABILITY STUDY

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&
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CHÂTEAUX DU VILLAGE – STAGE 2

PREPARED BY:

ATREL ENGINEERING LTD
PROJECT NO. 120301
OCTOBER 2020

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dated December 4, 2013

1.0 BACKGROUND

1.1 General

Atriel Engineering Ltd. has been retained by ANCO Homes to complete a Serviceability Study in support of an application to develop approximately 36.06 ha. in the Township of Alfred-Plantagenet.

The proposed development is situated on Lot 29 - Broken Front Concession as well as Lot 29 and the West Half of Lot 28 - Concession 1. It is situated just East of Castel Street between Wendover's Main Street and Highway 17, as illustrated in **Figure 1**. The overall proposed site, known as Châteaux du Village – Stage 2, is divided into an East Parcel and a West Parcel.



Figure 1 – Location Map

Châteaux du Village – Stage 2 (orange and blue) is comprised of approximately 423 single family units in total as well as approximately 1.08 ha. of green space. Furthermore, the future development (yellow) includes approximately 126 single family lots.

The objective of this report is to provide clarifications to demonstrate that there is sufficient capacity in the existing sanitary sewer, storm sewer and watermain systems to adequately service the proposed development.

1.2 Existing services

The site can physically be connected at the following locations:

West Parcel

- there is an existing 200mm diameter watermain on Castel Street.
- there is an existing 300mm diameter watermain on Du Centre Road.
- there is an existing 375mm diameter sanitary sewer on Du Centre Road.
- there is an existing 1350mm diameter storm sewer on Du Centre Road leading to an existing inlet to the existing Stormwater pond.
- road connections are available
- Hydro, Bell Cable and Gas was not part of this preliminary serviceability study; it will be verified during the draft plan circulation.

East Parcel

- there is an existing 200mm diameter watermain on Main Street .
- there is an existing 200mm diameter sanitary sewer on Main Street.
- road connections are available
- Hydro, Bell Cable and Gas was not part of this preliminary serviceability study; it will be verified during the draft plan circulation.

1.3 Design constraints

- i) As previously stated, there is a watermain connection available at the intersection of Castel Street and Du Centre Road as well as a future connection available on Main Street. As shown in the next section, phases 1 and 2 of Stage 2 as a whole were analyzed, in addition to the complete network, in order to confirm that the temporary building phases satisfy minimum requirements (See Appendix ‘A’ - 120301-PHM - Macro Phasing Plan). The water connection to Main Street is proposed to be done at the same time as phase 3.
- ii) In addition, a temporary access route will be constructed between phase 3 of the development and Main Street in order to provide a secondary access in case of emergency. Temporary drainage of this access route is provided in section 2.4 of

this report.

- iii) Surface grading of the West Parcel must be designed in order to convey major overland flows to the existing stormwater management facility located just west of the proposed site while overland flows from the East Parcel will be conveyed to a new stormwater management facility (Refer to **Figure 1**).
- iv) The sanitary sewer system of the West Parcel will connect directly into the existing system from Château du Village – Stage 1 on Castel Street. The East Parcel’s sanitary sewers will be directed to a proposed pumping station and be pumped to the existing Wendover Pumping Station via a proposed forcemain (Refer to Figure 1).
- v) The permissible grade raise restrictions for the site have been verified. In order to allow for adequate servicing of the site, some grading modifications will need to be made around some dwellings as per Paterson Group’s Geotechnical Investigation, dated December 4, 2013 (See Appendix ‘G’).

2.0 PROPOSED SERVICES

2.1 Watermain

Water supply to the Châteaux du Village – Stage 2 development will be provided through the installation of watermain pipes. As previously mentioned, two scenarios were studied for this report in order to assess both the temporary and permanent site conditions.

The West parcel will connect onto the Castel Street watermain at nodes J220 and J224 and will eventually be looped towards Main Street. (See Appendix ‘B’ - 120301-WA1 for watermain layout and construction phases).

The East parcel will be serviced via the existing West parcel and the existing connection at Main Street.

The system was designed using the City of Ottawa’s “Ottawa Design Guidelines – Water Distribution”.

Average day consumption rates were taken to be 350 l/c.d. Maximum day and peak hour demands were calculated as shown in the following table.

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

Water Demands

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
Overall System	9.0349 l/s	22.5957 l/s	49.7094 l/s
Phases 1,2,3	3.7982 l/s	9.5035 l/s	20.9071 l/s

The above flows were individually tabulated and are shown in Appendix “B”.

Fire-flows of 167 l/s were also simulated at all nodes during maximum day demand. Preliminary results demonstrate that both the overall site and the interim phases will meet the governing authorities’ requirements for flows and pressure during all conditions. The analyses’ results are found in Appendix ‘B’ of this report, Tables 100 to 109 show the results for both the overall system and the interim phase. Table 110 offers clarifications with regards to the fire-flow calculation.

2.2 Sanitary Sewer

The sanitary sewers for the West Parcel will discharge directly into the existing system from Stage 1. The East Parcel’s sanitary sewers, however, will be directed to a proposed pumping station which will pump the flow to the existing Wendover Treatment Plant located west of the proposed site.

The following table summarizes design parameters used throughout the design process.

Design Parameters

Population Density	3.1 person/household
Manning’s Roughness Coefficient	0.013
Residential Average Flow	350 L/day/cap.
Infiltration Rate	0.28 L/s/ha.
Minimum Velocity	0.6 m/s
Maximum Velocity	3.0 m/s

Sanitary flows were calculated using the above variables while Peaking Factors were calculated using Harmon’s Peaking Factor Equation.

Design sheets for both parcels are present in Appendix ‘C’ of this report. Furthermore, plan 120301-SANM in Appendix ‘C’ offers details regarding the sanitary sewer alignments.

Pipe sizes in the West Parcel have been chosen in order to minimize slopes thus allowing a satisfactory grade raise of the site.

The Stage 1 sanitary system was found to have sufficient remaining capacity to accommodate the West Parcel as shown on Table 111. Furthermore, the proposed East Parcel pumping station will be adequately designed to service the remaining area.

2.3 Future Pumping Station and Sanitary Forcemain

As mentioned in the previous section, the East Parcel's sanitary sewer will be directed to a proposed pumping station which, in turn, will convey the flow to the existing Wendover Treatment Plant via a sanitary forcemain (See Figure 1 in Section 1.1 of this report). A complete analysis/design of the pumping station and forcemain has not been completed at this preliminary stage.

Both components will eventually be sized accordingly in order to maintain the appropriate pressure and scouring velocity in the pipe. A by-pass forcemain will be included to allow a pump truck to temporarily discharge through the forcemain in case of failure. An overflow will be provided between the pumping station and the storm water management pond, if possible.

A suitable pumping station invert was chosen for the purpose of this preliminary analysis which will be confirmed during the detailed design process.

2.4 Storm Sewer and Stormwater Management

In order to meet the MOE quality and quantity control criteria, the storm water runoff will be conveyed to different stormwater management facilities as previously mentioned in this report. As per J.F. Sabourin and Associates Inc.'s Stormwater Management Pond Design Brief dated November 2008, stormwater runoff from the West Parcel of the site will be conveyed to the existing pond via an existing 1350mm diameter inlet located on the south side of the pond (See Appendix 'D' - 120301-STMM for storm sewer layout and drainage areas).

The storm water system quality and quantity sizing was developed as follows:

- i) Post to Pre development control.
- ii) The major and minor systems were mainly designed in accordance with Sections 5 and 6 of the City of Ottawa Sewer Design Guidelines, dated June 2012.
- iii) Rear yard and roadway catchbasins are to be equipped with inlet control devices restricting flows.
- iv) Under a 100 year storm condition, the minor system capture will be equivalent to the 1 in 5 year storm event + 12% to account for the additional head on the ICDs.

- v) The hydraulic grade line in the storm sewer is designed to allow a clearance of at least 0.3m between the underside of footing and the 100 year HGL.
- vi) Maximum road sag shall be 0.30m.
- vii) At least 80 m³/ha. of on-site storage will be provided throughout the entire site.
- viii) All major and minor system flows are captured by the SWM ponds at the ultimate stage (Existing pond for the West Parcel and Proposed pond for the East Parcel).
- ix) The major system shall be designed with sufficient capacity to allow the excess runoff of a 100-year storm event to be safely conveyed to the SWM Ponds.
- x) The temporary access route's runoff will be directed, overland, to the east to be discharged in the existing ditch, which in turn, is directed to the Ottawa River. Once the road is fully built, storm runoff will be captured within the minor and major systems and be directed to the proposed pond.
- xi) The detailed design of the new pond will be provided during the detailed design process of the East Parcel.

The storm design sheets can be found in Appendix 'D' of this report which show the results for both the 5 year and the 5 year + 12% scenarios.

Finally, the storm runoff from the East Parcel of the site will be serviced with the help of a proposed stormwater management facility as shown in Figure 1 of this report. Further analysis is required and final design details will be available at the time of the full design submission. At this time, suitable pond elevations were chosen in order to perform this preliminary analysis.

2.5 Macro Grading

A geotechnical investigation was carried out in order to assess the possible design constraints. Maximum grade raises were found and tabulated in the report by Paterson Group (See Appendix 'G' – Paterson Group's Geotechnical Investigation, dated December 4, 2013).

These maximum grade raises were respected in the preparation of a macro grading plan (See Appendix 'F' – 120301-GRM). As per the Paterson Group, EPS light weight fill might need to be installed in garages and porches in some of the dwellings in order to properly service the proposed site. It is also anticipated that house models will be specifically chosen in certain areas in order to accommodate for restrictive grade raises. A sketch is present in Appendix 'E'(120301-HML) illustrating the required house model specifications in order to allow for a 0.30m freeboard between the underside of footings and the sanitary sewer obverts.

2.6 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 site as well as along the perimeter of the existing stormwater management facility (See plan 120301-ESCM in Appendix ‘E’ for details).

Although a preliminary erosion and sediment control plan is submitted at this stage, an updated plan will be prepared at each construction phase and be subject to the approval of all governing authorities.

2.7 Noise Control Study

A preliminary noise control study was performed, the Annual Average Daily Traffic (AADT) was obtained from the United Counties of Prescott-Russell traffic counts (see Appendix “F”).

Outdoor, ventilation and warning clause requirements are summarized in the following table;

Assessment Location	L _{eq} (8 or 16 hrs as noted) (dBA)	Ventilation Requirements	Outdoor Control Measures	Warning Clause
OUTDOOR LIVING AREA (OLA)	Leq _{16 hr} Less than or equal to 55 dBA	N/A	None required	Not required
	Leq _{16 hr} Greater than 55 dBA to less than or equal to 60 dBA	N/A	Control measures (barriers) may not be required but should be considered	Required if resultant L _{eq} exceeds 55 dBA Type A
	Leq _{16 hr} Greater than 60 dBA	N/A	Control measures (barriers) required to reduce the L _{eq} to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible	Required if resultant L _{eq} exceeds 55 dBA Type B
PLANE OF LIVING ROOM WINDOW	Leq _{16 hr} Less than or equal to 55 dBA	None required	N/A	Not required
	Leq _{16 hr} Greater than 55 dBA to less than or equal to 65 dBA	Forced air heating with provision for central air conditioning	N/A	Required Type C
	Leq _{16 hr} Greater than 65 dBA	Central air Conditioning	N/A	Required Type D
PLANE OF BEDROOM WINDOW	Leq _{8 hr} Greater than 50 dBA to less than or equal to 60 dBA	Forced air heating with provision for central air conditioning	N/A	Required Type C
	Leq _{8 hr} Greater than 60 dBA	Central air conditioning	N/A	Required Type D

Plan 120301-NM in Appendix ‘F’ shows the noise level thresholds and their respective distances. The following table summarizes the different clauses at different distances from the road median.

Day (Living)		
dBa	Clause	Distance (m)
< 55	'OK'	169.64
≤ 65	'C'	41.35
> 65	'D'	< 41.35
Day (Outside)		
dBa	Clause	Distance (m)
< 55	'OK'	139.57
≤ 60	'A'	69.70
> 60	'B'	< 69.70
Night		
dBa	Clause	Distance (m)
< 50	'OK'	129.15
≤ 60	'C'	29.38
> 60	'D'	< 29.38

Based on the above clauses, a noise barrier may be required for some residential dwellings located adjacent to the property line of County Road 17. Furthermore, forced air heating or central air conditioning clauses may be required in some dwellings. Clauses may be required for other unit dwellings as shown in plan 120301-NM in Appendix “F”.

3.0 CONCLUSION

This site can be serviced as proposed above. The dwellings will be drained with adequate protection to the site and the environment. A sanitary sewer with adequate depth will be available to provide a proper outlet for this development. A Geotechnical Report was submitted and made available.

Finally, the following engineering issues should be verified:

1. The proposed watermain layout will adequately service the development. Furthermore, the neighbouring subdivision has been serviced without any issues.
2. The sanitary sewer has been kept at a minimum slope by sizing the pipes in order to minimize the grade raise.
3. It was determined that the existing sanitary sewers from Stage 1 have sufficient remaining capacity in order to accommodate the West Parcel. Also, a new pumping station is proposed to service the East Parcel.
4. The stormwater management pond for the West Parcel already has MOE approval

- for the entire area.
5. The proposed stormwater management scheme for the East Parcel will have to be approved in principal by the conservation authority and the City prior to proceeding with the final design.
 6. Stormwater runoff from the West Parcel will be directed to the existing Stage 1 stormwater management facility, while a new pond will need to be designed in order to properly service the East Parcel’s storm runoff.
 7. The utilities have not been approached but nearby subdivisions have been serviced without complications; comments are expected through the draft plan application process.

Prepared by:

ATREL ENGINEERING LTD



Jean Décoeur, P.Eng.
President

APPENDIX "A"

120301-PHM

Macro Phasing Plan

APPENDIX "B"

120301-WMM – Macro Watermain Layout and Demand

Table 100 - Node Data - Overall System

Table 101 - Pipe Data - Overall System

Table 102 - Reservoir Data - Overall System

Table 103 - Average Day and Peak Hour Demand Results - Overall System

Table 104 - Maximum Day Plus Fire-flow Results - Overall System

Table 105 - Node Data - Phases 1 and 2

Table 106 - Pipe Data - Phases 1 and 2

Table 107 - Reservoir Data - Phases 1 and 2

Table 108 - Average Day and Peak Hour Demand Results - Phases 1 and 2

Table 109 - Maximum Day Plus Fire-flow Results - Phases 1 and 2

Table 110 - Fire-flow Calculations Table

APPENDIX "C"

120301-SANM - Macro Sanitary Drainage Area Plan
Sanitary Sewer Design Sheet (West Parcel)
Sanitary Sewer Design Sheet (East Parcel)

APPENDIX "D"

120301-STMM - Macro Storm Drainage Area Plan
Storm Sewer Design Sheet (5 year) (West Parcel)
Storm Sewer Design Sheet (5 year + 12%) (West Parcel)
Storm Sewer Design Sheet (5 year) (East Parcel)
Storm Sewer Design Sheet (5 year + 12%) (East Parcel)

APPENDIX "E"

120301-GRM - Macro Grading Plan

120301-HML - House Model Layout

120301-ESCM - Macro Erosion and Sediment Control Plan

APPENDIX "F"

120301-NM - Macro Noise Study Plan

APPENDIX "G"

Paterson Group's Geotechnical Investigation - Proposed Chateaux du Village Stage 2,
dated December 4, 2013