Agnes Street Infill Development

Wastewater Systems Information

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1. Introduction

The Agnes Street Infill development proposal provides an opportunity for the creation of a new form of housing in Alton that will fill a gap in the local housing supply and support local, regional and provincial policies to create more housing. The proposed form of wastewater servicing is fundamental to the proposal and is founded on a significant amount of scientific research and in-field practice. It meets regulatory standards and uses a proven, Ontario-based wastewater treatment technology that has been used in many jurisdictions across North America.

Because there is no municipal wastewater system for the village of Alton nor, as explained below, will Peel Region permit private Communal wastewater systems (servicing more than five (5) residential units and in our case sixty five (65) residential units) in the Region, individual

smaller scale on-site systems are the only alternative. The proposed on-site sewage systems shared four and five townhouse units each, fit within the Ontario regulatory framework and are an innovative and safe way of facilitating a more efficient and affordable housing alternative than the status quo of large single detached homes on individual private septic systems.

This document is intended to provide a factual outline of the regulatory context, hydrogeological / groundwater research undertaken, an overview of the proposed treatment systems and anticipated conditions of approval, operational / maintenance requirements and practices and a summary of possible operational issues and how they will be addressed / mitigated.

This information provides answers to the questions and alleviates concerns raised by the community about how the wastewater treatment aspect of this proposed townhome development will work.

2. Applicable Regulations

On-site Sewage systems of over 10,000 litres per day require an Environmental Compliance Approval (ECA) approval from the Ministry of the Environment, Conservation and Parks (MECP) under the Ontario Water Resources Act. Furthermore, private residential Communal systems of over 10,000 L/day, and where there are greater than 5 residential units, require a Municipal Responsibility Agreement. However, Peel Region's policy is to not take on such an agreement, thus requiring this site to have smaller individual on-site systems.

Individual on-site sewage systems are defined by Provincial regulations to include systems of up to 10,000 L/day serving up to five households, i.e. without the need for a Municipal Responsibility Agreement. Such systems are regulated under Part 8 of the Ontario Building Code ("OBC") and are approved by the municipal Building Department.

In addition to the OBC effluent criteria for advanced treatment systems meeting OBC level IV effluent quality for Biological Oxygen Demand ("$CBOD_5$") and Suspended Solids ("TSS"), there are other regulations in place governing nitrate levels for subsurface discharge. Nitrate levels naturally dissipate as effluent travels through the ground by vegetation and through dilution through infiltrated precipitation. Shallow soils, consisting of silty sand, will provide attenuation and slow the travel time of sewage effluent allowing for additional dilution before discharging to surface waters.

The applicable nitrate regulations come from several different bodies:

- Ontario Ministry of the Environment, Conservation and Parks (MECP) Procedure D-5-4 requires the municipal approval authority to look at cumulative impacts from any privately-serviced multi-lot development such as this one, regardless of whether it is for townhouses or single detached homes. It requires nitrate levels be no more than 10 mg/L at the point where the effluent reaches the property line.

- Credit Valley Conservation (CVC) and Canadian Water Quality Guidelines (CWQG) for nitrate in shallow groundwater require that nitrates have dissipated to less than 3 mg/L at the point where the groundwater containing the treated effluent reaches the receiving watercourse, in this case, Shaws Creek.
- Region of Peel is responsible for the municipal wells and essentially requires negligible impact by the time any diluted effluent in the creek passes by the municipal wells approximately 650 meters downstream of the site.

3. Hydrogeological Report

A hydrogeological study was commissioned from Terraprobe (now part of Englobe), a recognized professional firm. The Town has engaged a third party expert EGIS Canada Ltd. (EGIS) to peer review the report.

- The hydrogeological study began by assessing the existing groundwater conditions across the property through to Shaws Creek. This was done by drilling 8 boreholes with four monitoring wells installations, reviewing neighbouring well records, doing a physical local well survey and reviewing other publicly available data to create a groundwater flow model.
- Once the proposed fourteen (14) leaching / dispersal bed locations were established, a further 18 test pits were dug to confirm soil conditions and high groundwater conditions for each bed location.
- The regulatory criteria for treated effluent discharging to Type 'A' dispersal beds, mentioned above, were identified and the most onerous criteria were adopted. The applicable criteria are:
    - no greater than 10 mg/L for each of $CBOD_5$ and TSS set by the OBC to discharge Level IV (tertiary quality) effluent into the ground.
    - below 3 mg/L for nitrates at Shaws Creek (which is more onerous than the MECP's regulation D-5-4 requirement of 10 mg/L at the property line).
- Taking into account background groundwater flows and nitrate levels, Terraprobe concluded that to meet the applicable guideline for nitrate to surface water (CWQO) at below 3 mg/L to Shaws Creek, the Nitrate / nitrogen level of the treated effluent when it is discharged to the on-site leaching beds must be no more than 5.2 mg/L
- Given this level of pre-treatment for nitrate (5.2 mg/L) the expected nitrate concentration at the downgradient property limit was calculated at 3.5 mg/L. This level of treatment exceeds the MECP Procedure D-5-4 requirement for 10mg/L at the property line.
- Terraprobe concluded that if this level of treatment is attained, the municipal wells would not be affected by either the creek or direct groundwater flows from the site due to the

significant distance travelled and intervening dilution / dissipation effects through infiltrating precipitation and given the documented flow volumes for Shaws Creek.

- EGIS has presented a number of questions and comments on the hydrogeological report which are currently being responded to by Terraprobe. A revised version of the report is being submitted prior to with the final Planning Act application and we are confident that EGIS will be satisfied with it.

4. Wastewater Flows and Occupancy Projections

Wastewater design flows are specified by the OBC taking into account the living area of a home, the number of bedrooms and the number of plumbing Fixture Units. The OBC (under Table 8.2.1.3.A.) designates flows for each of these considerations and the daily design sanitary sewage flow (Q) is established.

Exact flows will be determined at the time of building permit applications based on the final floor plans of the units, but to be conservative, the sewage treatment systems meeting Level IV effluent quality, and leaching / dispersal bed areas have been sized to accommodate systems serving the four-unit blocks with design flows of up to 8,000 litres per day ("LPD") [c/w two 3-bedroom and two 4-bedroom units] and the beds for the five-unit blocks are sized for up to 9,900 LPD [c/w three 3-bedroom units and two 4-bedroom units]. This would allow for finished floor areas of up to 2,360 ft^2 (220m^2) and a mix of three (3) and four (4) bedroom units and twenty-four (24) plumbing fixture units.

Refer to the Gunnell Engineering Functional Servicing Report and the detailed drawings. For 3-bedroom townhouses, the daily design sewage flow is 1,800 L/day. For 4-bedroom townhouses, the daily design sewage flow is 2,200 L/day.

Based on multi-family dwellings, the OBC allocates 275 L per person, and based on the proposed dwellings, this would equate to 6 persons per 3-bedroom unit and 8 persons per 4-bedroom unit (i.e. 2 persons per bedroom).

Empirically, actual sewage flows tend to be approximately 50% of the OBC daily design sewage flows, with the higher conservative OBC flows allowing for periodic peak flows.

5. Treatment Systems

- Waterloo Biofilter (or a regulatory approved equivalent supplier) will provide pre-engineered treatment systems to meet the OBC effluent criteria for treatment of: CBOD5: 10 mg/L and TSS: 10 mg/L for Level IV (tertiary) advanced treatment and advanced treatment to achieve the above-referenced effluent criteria for Nitrate / nitrogen of 5.2 mg/L.

- Gunnell Engineering, which specializes in sewage system design, are designing the overall sewage system, the leaching / dispersal beds and will supervise installation of the treatment systems and the construction of the sewage system's leaching / dispersal beds.

- At the time of construction, each sewage system will require a Building Permit to be issued by the Caledon Building Department.

- A condition of Draft Approval will require that in addition to the normal Building Code effluent criteria, the nitrate / nitrogen treatment criteria detailed above will also be applicable.

- Waterloo Biofilter sewage treatment systems are certified under CAN/BNQ 3680-600 to treat $CBOD_5$ and TSS to the Level IV classification under the OBC, which is 10 mg/L for both parameters. The company has installed over 15,000 systems, of which upwards of 1,000 are commercial and / or multi-unit residential units with flows greater than 5,000 L/day.

- Waterloo Biofilter's WaterNOx-LS denitrifying systems were tested under the CAN/BNQ 3680-600 test protocol achieving greater than 75% Total Nitrogen removal. There are numerous WaterNOx-LS systems installed in the field and regular test results confirm consistently-acceptable results well below the nitrate-nitrogen target of 5.2 mg/L required for this project.

- Thousands of Waterloo Biofilter systems have been operating in Ontario since the 1990s and have proven to be very reliable. They have very stable fixed media to host the bacteriological digestion, handle fluctuating flows well and have very few moving or mechanical parts other than pumps to move the effluent from one stage to the other.

- The Waterloo Biofilter systems have minimal sludge build-up, similar to a septic tank. The first 'Anaerobic Digester' tank typically needs pumping out every 3-5 years. The operator will recommend when pump-outs are needed based on usage and the actual solids build-up observed during the annual inspection.

- There is a 20 year warranty on the primary media on which the sewage-eating bacteria grows. So far since the 1990's none have needed replacement when used within design parameters. Some have required replacement if for example a large amount of paint or acid was discharged into the sewage system.

Waterloo Biofilter System - Filter Medium (Guelph, Ontario manufacturing facility)

- The media for denitrification needs to be replaced approximately every 10 years.
- Construction will be undertaken by an OBC licensed sewage system installer approved by Waterloo Biofilter under the supervision of Gunnell Engineering and Waterloo Biofilter.
- As common elements, the sewage systems are covered by the Tarion warranty. In the first year following registration of the condominium, each Condo Board is required to commission a professional engineer to do a performance audit (technical audit) entailing a detailed inspection of the sewage systems to ensure that they were properly built and are performing according to specifications. This performance audit is submitted to Tarion prior to the end of the 12th month following registration. Any deficiencies would be identified and must be corrected by the Builder by the end of the Builder Repair Period prior to the release of the security lodged with Tarion.

Waterloo Biofilter Standard Layout

Waterloo Biofilter System - landscaped area with access lids

6. Operation and Maintenance Requirements

- Sections 8.6 and 8.9 of the OBC deal with the Operation and Maintenance of all individual on-site Sewage Systems and prohibit the discharge of untreated effluent into the environment. Unlike with septic tanks, the owners of all advanced sewage treatment systems are required to enter into a service and maintenance contract with an operator authorized and provided with operating instructions by the manufacturer. It requires the operator annually to have samples of the treated effluent tested and to report the resulting levels of $CBOD_5$ and TSS to the Chief Building Official of the Town of Caledon.

- Each sewage system will be a common element, owned and operated/ maintained by the condominium corporation that owns the block it serves. There will be one professional management company supporting all 14 condominiums, appointed by the overall common element condominium that owns the roads and Common Green.

- The Condominium Act has safeguards built in to ensure common elements, including sewage systems, are properly operated and maintained. For example, Sections 89 and 90 set out the Condominium's obligations to maintain and repair the common elements, and Section 99 requires the condominium to hold insurance in case of damage or other perils to the common elements. The condominium corporations thus have a statutory obligation to maintain the common element sewage systems in proper order.

- The Condominium regulations also include mandatory Reserve Fund provisions, being Sections 93 and 94 of the Act::

    - A comprehensive reserve fund study must be done by a professional within the first year following registration of the condos and it must be updated every 3 years.

    - These studies ensure that there is a build-up of reserve funds as part of the condo fees each year to ensure there are sufficient funds for any major repairs required and avoid the need for a special assessment at the time a system needs replacement.

- The minimum requirements set out in the Building Code and the Condo Act can be supplemented through the **Conditions of Draft Approval** of the Subdivision and/or the Condominiums. The following specific additional requirements are proposed to be included in the Conditions of Draft Approval, to be implemented through provisions to be written into the Condominium Declarations:

    i. That there will be one overall common element condominium corporation (the "Common Condo") that will own the roads and common green and will be given responsibility for coordinating the selection of a manager for the 14 condominium corporations that own the 14 blocks (the "Block Condos").

    ii. That the Declarations of the 14 Block Condos and the Common Condo provide for there to be one management company engaged to support all the Block Condos, such that the sewage systems shall always be professionally managed. The choice of manager and management company shall be selected by a majority vote of the Boards of the Block Condos. The Declarations of the 14 Block Condos shall further provide that the management company shall be required to arrange a contract with one qualified maintenance and operations contractor for all 14 sewage treatment systems.

    iii. That the sewage system maintenance and operation contracts described in condition (ii) above include a requirement to comply with the following effluent standards:

        - $CBOD_5$: 10 mg/L
        - TSS: 10 mg/L
        - Nitrate-Nitrogen: 5.2 mg/L

    iv. That the sewage system maintenance and operation contracts described in condition (ii) above include a requirement for continuous remote monitoring and an annual on-site inspection / servicing of the system. During the first year the contract shall also call for an interim inspection and effluent samples to be taken from each treatment unit after the first six months of operation following normal commissioning and startup testing procedures.

    v. That the Declarations of the 14 Block Condos provide that if the sampling described in condition (iv) above produces results that are out of compliance with the noted effluent standards for any system, a full inspection of such system shall be done and steps taken to bring the system back into compliance. The cost of such remedial action shall be borne by the individual Block Condo whose system is out of compliance.

    vi. That the Declarations of the 14 Block Condos and the Common Condo provide that the annual inspection report shall include all effluent sampling results and report on any actions taken in response to any out-of-compliance samples. Such report shall be submitted to the Chief Building Official of the Municipality and to

the management company who in turn will be responsible for distributing the report for each individual system to the respective Block Condo.

vii. That the Declarations of the 14 Block Condos provide that a technical Operation and Maintenance Manual be prepared, with copies supplied to the respective Boards, the Manager of the Condominium and the Sewage Systems Operations contractor.

viii. That the Declarations of the 14 Block Condos provide that a User Guide written in non-technical or layman's language be prepared, which provides practical guidance on the proper use of the sewage system. The Declarant shall include the User Guide as part of the closing documents for all agreements of purchase and sale, and the Declarations of the Common Condo and/or Block Condos shall require the User Guide to be given to any tenant.

ix. That the Declarants include the user Guide, described in condition (vii) above, in the Rules of the 14 Block Condos such that the guidelines relating to the sewage system may be enforced by the resulting condominium corporations. For greater certainty, these rules shall include language, to the satisfaction of the Town, providing access to each unit's water meter readings and guidelines for water usage to avoid overloading the systems as well as guidelines as to what substances can or should not be flushed down the drains.

7. Operations and Maintenance Practices

- Gunnell & Waterloo Biofilter will jointly prepare the above-described Operation and Maintenance Manual and User Guide, which includes a Do & Don't Homeowner list of acceptable discharges into the sewage system. Gunnell Engineering will provide the overall context and information about the leaching / dispersal beds and treatment parameters. Waterloo Biofilter will prepare the sections that pertain to the treatment units themselves. Here is a link to a sample standard form of Waterloo Biofilter homeowner manual.

- Each of the Condos will contract with the same service provider - Waterloo Biofilter or another Waterloo Biofilter approved operator for operations, maintenance and service including remote monitoring, and the periodic inspections/ sampling/ reports referred to above.

- Waterloo Biofilter is Guelph-based and has made it a priority to build the O&M side of their business, which allows Waterloo Biofilter to ensure conformity with their CAN / BNQ 3680-600 certification. Waterloo Biofilter is installing their systems for the homes in the new Osprey Mills subdivision presently being built in Alton. The Osprey Mills systems are operated to comply with the effluent and the maintenance / monitoring requirements of the Ontario Building Code. Waterloo Biofilter will have a contract to perform annual inspections there, so it is logical for them to perform the ongoing maintenance in the Agnes Street project as well. (Note: the Osprey Mills systems do not have the extra denitrification requirements that will be applicable to the subject development).

- However should Waterloo Biofilter ever discontinue its operations business or become uncompetitive, the logical alternative at the moment is Clearford Waterworks Inc. Clearford is the largest operator of privately owned communal water and wastewater treatment systems in Ontario, operates sewage systems in Mono and at the Osprey Valley Golf course in Alton, operates Waterloo Biofilter Communal systems in other municipalities and is familiar with their systems. Clearford has indicated it would be quite willing to take on this contract but acknowledges it would be more cost-effective in this context to deal directly with Waterloo Biofilter.

- Both Waterloo Biofilter and Clearford have emergency on-call departments for timely response to a failure. The operator will be able to make adjustments online or if a problem becomes apparent, will make arrangements for on-site service.

- The Condo corporation will have a separate contract with a local sewage hauler for occasional sludge / solids pump-outs and to be on standby in the rare instance where emergency haulage might be needed.

The operating contract will call for a full inspection and system servicing once a year. During the first year of operation an additional visit will be required to inspect the systems and obtain grab samples for laboratory testing of the treated effluent. If the analysis of the effluent sample indicates an out-of-compliance result, that will trigger a full inspection and servicing to ensure the system is put back into compliance.

The services for each full inspection / servicing would include:

- Check condition and safety of all tanks, enclosures, and access hatches.
- Examine anaerobic digester tank health and recommend if the tank needs pumping.
- Clean effluent and inline filter; if required.
- Test operation of all pumps and floats.
- Examine health of Biofilter treatment medium including colour and compaction.
- Clean spray nozzles, ensure even distribution over Biofilter medium.
- Examine the health of WaterNOx-LS denitrification medium and recommend if replacement is needed.
- Check charcoal filters (which reduce/eliminate odours) and recommend if charcoal needs replacing.
- Check Smart Panel operation and settings remotely; check that panel is properly sealed and inspect for corrosion.
- Take grab samples of sewage and final effluent and have them analyzed.
- Check the health of the leaching bed; moisture, grass cover, grading.
- Record findings on Waterloo Biofilter System Maintenance Report.

- Provide a report to the Condominium Corporation summarizing the inspection results and any recommendations or repairs done.
- If necessary, consult with the Condominium Corporation about best management practices.

8. Possible Problem Scenarios and Safeguards / Remedies

Like any human-devised system, it is possible that problems will arise, requiring safeguards and remedies:

- There is negligible risk of hydraulically overloading the sewage systems due to over-occupying the units because of the safety factors built into calculating the design flows as discussed in Section 4 above. Furthermore, there are safety factors built into the design of the systems including balancing of peak flows to enable them to handle temporary surges. Each unit will have a water meter installed, and language will be included in the condominium declaration setting guidelines for water and sewer use. That way, this information can be recorded, and preventative measures can be taken if water readings show signs of excessive use, i.e. a leaking toilet.
- In the event of a power outage or pump failure - sewage stops flowing to the system. There is no risk of discharge of untreated effluent into the beds. The operator will be advised via remote monitoring.
- If a system stops functioning or a tank reaches a critical level, the operator will know via remote monitoring and an audible alarm will go off on the panel mounted on the exterior of each system located within the common area.
- The plans call for two alternating pumps - if one pump fails the other would take over. If a pump failure is detected the operator would send a technician out to replace the non-operating pump.
- The pump stations include storage tanks designed to retain 1 day of daily design flow = in reality 2 - 4 days of actual usage. If operations can’t be resumed within 48 hours, the condo may need to pump out the tanks until service is restored.
- If a tank needs a pump-out, the operator would call the local hauler that the condo has on contract. The residents will also have the hauler’s number in case of emergency.
- If despite the instructions in the User Guide, a deleterious solid substance is flushed into the system, it will go into the first chamber (primary digester tank) and won’t be passed onto the subsequent tank. If anything is observed that shouldn’t be in the first tank, it may necessitate a premature pump-out.
- If despite the instructions in the User Guide, a resident flushes a large-enough quantity of a harmful liquid substance to disrupt the bacteriological process, it may result in unhealthy sewage, smells coming from the system or poor effluent quality, which can be

detected visually or through sampling by the service provider. For most substances and quantities, the systems will naturally recover their equilibrium. In the worst case scenario, Waterloo Biofilter may have to clean and seed the system with new start-up bacteria. There is no more harm to be done than if an individual flushes something to disrupt the process in their stand-alone septic tank, except in this case there are 4 or 5 families affected and able to respond. If anything, there is more 'peer pressure' to act responsibly than in the case of a single detached home. And an advantage of having the 4- or 5-unit sewage systems is that poor quality sewage from one residence will have less of a negative impact on the overall sewage system.

- Both the Condominium managers and the homeowners / residents will have copies of the User Guide and be trained to know what to look for and to know when to call the operator.

9. Consulting Team

The sewage system requirements have been assessed by, and the designs and proposed operational parameters and safeguards have been developed by the following professionals:

- Hydrogeology and Sewage System Assessment: Paul Raepple, Terraprobe now Englobe (Brampton)
- Sewage System Overall Design: Eric Gunnell, P. Eng., Gunnell Engineering Ltd. (Newmarket)
- Sewage System Pre-Engineering and Supply: Brady Straw, B.Sc., Head of Engineering, Waterloo Biofilter Systems Inc. (Guelph)
- Condominium Law: Jonathan Pettit, M.A., J.D., Smith Valeriote Law Firm LL (SV Law) (Guelph)
- Condominium Property Management – Jamie Poodry, V.P., Five Rivers Property Management Group (Guelph)
- Planning Consultant – Michael Vani, BURPL, MCIP, RPP, Weston Consulting (Vaughan & Toronto)

This document has been coordinated by Seaton Group with contributions from all the above consulting team members in their respective areas of expertise.

ATTACHMENTS/ LINKS

Terraprobe/Englobe Hydrogeological Report
Gunnell Sewage System Functional Servicing Report, including drawing details
Waterloo Biofilter NOx-LS Brochure.pdf