

Project #: 18037

May 23rd, 2018

Owners of Strata Plan LMS 3080

100 Blackberry Drive,
Anmore, British Columbia V3H 5B4

Attention: Ms. Brandie Roberts, Strata VP

Ministry of Environment and Climate Change Strategy

200 – 10470 152 Street
Surrey, British Columbia V3R 0Y3

Attention: Mr. Daniel P. Bings
for Director, Environmental Management Act
Environmental Protection Division, Regional Operations Branch
Compliance Section

Re: Pollution Abatement Order (109390)
Owners of Strata Plan LMS 3080 (Known as Anmore Green Estates)

Executive Summary

CTQ Consultants Ltd. (CTQ) has been retained to assist the Owners, LMS3080 by providing this independent engineering review and assessment of certain matters to be addressed in Abatement Order: 109390 issued by the Ministry of Environment and Climate Change Strategy (MOE) dated April 18th, 2018. A reference copy of the Abatement Order is enclosed with our report.

We were provided documentation for our review from Associated Environmental Consultants Inc. (AE). Any information that was relied upon for this review is listed within this report.

Our report is based upon our independent review of relevant documentation given to us by Associated Environmental Consultants Inc. (AE), and we have listed such documentation that we consider reliable in preparation of our report.

ENGINEERING

PLANNING

URBAN DESIGN

While there usually exists more than one solution to a particular challenge, we must complete a litmus test before making our Professional recommendation. Optimising the solution so that it is sustainable is the goal of every solution. Sustainability can be assessed in terms of the social, environmental and financial parameters:

1. The duty to uphold and protect the public interest is paramount; (Social)
2. Protection of the Environment; (Environmental)
3. Is it a practical, financially sound solution (Financial)?

This is not the first time that this system has not met the requirements of the Waste Discharge Permit (4606) and a detailed summary of events can be found in the Action Plan for Pollution Abatement Order 109192 dated January 19th, 2018 prepared by AE.

This report is based on sound Engineering judgement, Best Management Practices and an acceptable level of risk.

Solutions reviewed were as follows:

1. Reconstruction of the existing system;
2. Mounded System;
3. Tertiary Treatment (on-site and off-site discharge);
4. Pump and Haul; and
5. Tie into the existing Municipal Sanitary Sewer System.

CTQ and the writer of this report are not willing to Professionally sign off on any solution other than abandoning the existing disposal system and tying AGE's sanitary sewer system into the municipal sanitary sewer system to eliminate the risk to the Public and the Environment. The reasons for this recommendation are outline within this report.

1. Introduction and Scope of this Report

This report focusses on the most recent Abatement Order (109390) which states that the Director of the Environmental Management Act is satisfied that there is breakout causing pollution on the school District property. The Owners of Strata Plan LMS 3080 are ordered to comply with;

1. Retain a Professional Engineer to address options for continued on-site disposal under the Waste Discharge Permit 4606; (This report)
2. Retain a second Professional Engineer, approved by MOE, to review this report; (Completed by Mr. C. Jeffery Oland, P.Eng. Approved by MOE on May 10th, 2018 via email)

3. Submit the peer review assessment by May 23rd, 2018;
4. Continue to take actions to mitigate the risk of Human contact. (AE – Responsible).

This report is the deliverable under item 1. Of the Abatement Order which will be peer reviewed as required under item 2. Of the Abatement Order.

This report reviews, historical documentation, regulations relating to the design of the effluent disposal systems, the evidence of failure and possible solutions. From this, recommendations are provided.

2. Information Reviewed and Relied Upon

The following documents were provided to CTQ and were relied upon in preparation of this review report.

1. Abatement Order 109390, dated April 8th, 2018;
2. Action Plan for Pollution Abatement Order 109192 (PE 4606) dated January 19th, 2018;
3. The follow up Formal Report – Pollution Abatement Order 109192 (PE-4606) (Authored by AE, dated April 5th, 2018);
4. Technical Memorandum from AE dated October 16th, 2017 (Results of September 2017 Soil Testing), and
5. Assessment of the Ability to Repair or Replace the Septic Treatment Plant Effluent Disposal Fields at Anmore Green Estates, Anmore, BC prepared by S. Graham Engineering and Geology Inc., (GEG) dated January 15th, 2018.

Material facts from the above are not repeated in this report except where necessary to summarize findings or recommendations.

3. Regulation Relating to the Design.

While it was stated in the Abatement Order that..."Under a permitting regime, the statutory decision maker is not bound by the restrictions within the Municipal Wastewater Regulation and may approve anything which is sufficiently protective of the environment and human health..." as designers of systems we take these regulations as minimums. As regulations change from time to time, Best Management Practices dictate that we should design to the most up to date requirements when it comes to Public Health and Safety.

Understanding the responsibilities and duties of a Professional Engineer is key to how recommendations in this report are derived. The people of British Columbia, through an Act of Parliament, have given Professional Engineers and Geoscientists responsibilities and the right of self governance. The "Engineers and Geoscientists Act" states that "...the Association in it's duties is to uphold and protect the public interest respecting the practice of Professional Engineering..."

The Engineers and Geoscientists of British Columbia (The Association) in its Code of Ethics states as the number one tenet, "Hold paramount the safety, health and welfare of the public, the protection of the environment and promote health and safety within the workplace."

Therefore while the Waste Discharge Permit 4606 was approved under different regulations than the Municipal Wastewater Regulations of today it is our belief that the most current regulations should govern our recommendation.

4. Evidence of Failure

We do not think there is any question to the evidence of failure of the Anmore Green Estates effluent ground disposal system. As stated in the report prepared by GEG, there are numerous reasons why the disposal fields cannot be reconstructed, from geometric requirements such as pipe length, required setbacks, depth to unsaturated soils and required distances for down gradient breakout. Therefore if a suitable treatment process was installed the likelihood of breakout still exists and as such the risk to the Public Health still exists as it is unlikely that the treatment process is fail-proof.

5. Possible Solutions Reviewed

The Abatement Order states..."Retain a professional engineer to prepare a detailed report which addresses options for continued on-site disposal of Anmore Green Estates sewage flows under the authority of waste discharge permit 4606. This report must address all possible options and discuss their viability."

While the order only requires review of on-site disposal options we have also reviewed other options that do not include on-site disposal.

Many of the following systems have been reviewed by previous reports and information from these reports have been utilized in our review. The results of our review have been tabulated herein Table 5.1.

1. **Re and Re the existing Disposal Fields;** The original design utilised aggressive percolation rates in the calculations for the field size and since the down gradient conditions have changed there is evidence of Breakout. This unfortunately means that no ground disposal system will be acceptable due to the possibility of Breakout no matter what the quality of effluent.
2. **Mounded Disposal Field;** In the mounded system there is the ability to have evapotranspiration as well as infiltration and as such due to site geometric restrictions and infiltration rates this is not a viable option.
3. **Tertiary Treatment system;** While this will treat the effluent to a higher standard the issue becomes disposing of the effluent flows and volume. There are various types of Tertiary Treatment plants and they all involve some form of nutrient and solids removal as well as disinfection. These systems are very costly and require advanced operator experience to run and

maintain the system. While this type of treatment can produce effluent to Class A or B they are not failsafe and in the writer's opinion well above the capabilities of a Strata of this size.

- a. **Disposal to Ground;** This option has been reviewed and rejected as indicated in items 1 and 2 above.
 - b. **Disposal to Surface Water;** While this option is a possible solution there are other factors that need to be considered. The local watercourses dry up during the dry months and therefore the dilution factor is not achieved. This would mean that if there was a disturbance in the treatment system and the effluent quality was reduced the risk of pollution would be increased.
 - c. **Disposal to deep with injection wells.** We have seen this procedure work well with geothermal systems however it greatly relies on, the permeability of the receiving ground, the chemical and biological conditions of the receiving medium. Chemical and biological fouling of the injection screens can occur rapidly causing a large reduction in flow to the point of failure. Rehabilitation of these plugged wells is time consuming and expensive. It is usually completed using either chemical and/or mechanical means to return them to their optimal flow.
4. **Pump and Haul;** This method is usually used as a temporary measure until a permanent solution is found. This is because it is expensive and very dependent on trucking and disposal costs.
 5. **Disposal to the Municipal Sanitary Sewer System.** This system is the standard of modern Urban communities and is by far the most reliable method of sewage collection and treatment. The fact of scale makes this option sustainable in all the three factors.

Table 5.1 – Summary of Findings.

Treatment/Disposal Method	Order of Cost	Risk of Failure	Reason
1. Re and Re existing disposal Fields	Low to Medium Cost	Very High	Breakout of existing Ground Water in the wet season.
2. Mounded Disposal Field	Medium Cost	Very High	Same as Item 1.
3. Tertiary Treatment a. To Ground Disposal b. To Surface Water c. To Deep Injection Wells	High Cost High Cost Extremely High	Very High High High	Same as Item 1. Dilution requirements and reliability. Chemical & Biological Fouling.
4. Pump and Haul	Very High Cost	Low	Basically, an expensive option to 5 below.
5. Connect to Municipal Sewer	Low Cost	Negligible	Meets all requirements.

To expand on the table above:

1. Items 1, 2 and 3.a. above utilise the reuse of the ground disposal area and will still have risks of effluent breakout down gradient to the disposal fields especially in the wet season and therefore is not acceptable;
2. For item 3. - Tertiary Treatment has its own complexities and sophistication that may not be best suited for a private Strata Group;
3. Respecting item 3.b. utilizing disposal to surface waters will fail to meet the requirements for sufficient dilution in the receiving waters at certain times of the year and as such cannot be considered viable;
4. Item 4, Pump and Haul is typically used as a temporary measure as it is not economically viable long term.
5. Item 5, disposal to the existing Municipal Sewer System will meet all the engineering and environmental requirements.

6. Recommendations

Upon review of the available data supplied to CTQ it is evident that without somehow changing the groundwater regime, which we are **NOT** proposing, as that will possibly just transfer the problem somewhere else, the ground disposal method in the existing fields is a non-starter.

While the Abatement Order only requires the review of “on-site disposal” we must bring to the attention that, from a purely Engineering perspective the only solution that is sustainable in all three areas, Social, Environmental and Financial is to tie into the existing Municipal Sewer Collection System adjacent to the development.

Sincerely,
CTQ CONSULTANTS LTD.

Matt Cameron, P.Eng., FEC
Managing Partner

Copy to: C. Jeffrey Oland, P.Eng – Oland Engineering
Ms Fawn Ross, B.Sc., R.P.Bio – Associated Environmental Consultants Inc.
Mr. Dan Bings – Ministry of Environment and Climate Change Strategy.

Attached: Abatement Order 109390, dated April 8th, 2018;
Formal Report – Pollution Abatement Order 109192 (PE-4606) (Authored by AE, dated April 5th, 2018)
Assessment of the Ability to Repair or Replace the Septic Treatment Plant Effluent Disposal Fields at Anmore Green Estates, Anmore, BC (Prepared by S. Graham Engineering and Geology Inc., (GEG) dated January 15th, 2018)
Approval email for peer review.