

MEMORANDUM

Date: February 13, 2020
To: Paulo Eichelberger, General Manager of Environmental Services
cc: Jaime Adam, Urban Systems Ltd.
Kimberly Zackodnik, Urban Systems Ltd.
Katrin Saxty, Urban Systems Ltd.
From: Adrianna Johnson, B.Sc.
Dr. Joanne Quarmby, R.P.Bio.
File: 0601.0086.01
Subject: Document Update – Reclaimed Water Use

1. Introduction

In 2017, an assessment was completed to evaluate creating reclaimed water at the Charlie Lake wastewater treatment facility (Evaluation of Reclaimed Water Use, dated December 2017, File # 0601.0073.01). Several options for reclaimed water use were identified, with the irrigation of agricultural lands being one opportunity.

Since the completion of the 2017 reclaimed water assessment, there have been changes in the BC legislative framework that could affect the intent to irrigate agricultural lands with reclaimed water. In February 2019, the Agricultural Waste Control Regulation was replaced with the Code of Practice for Agricultural Environmental Management (AEM Code). The AEM Code includes approaches to manage nutrient applications to land, and reclaimed water is identified as a potential nutrient source. A review of the requirements of the AEM Code is presented below and focuses on the implications for any future activities related to reclaimed water irrigation. Although not included in the intended scope of work, there have also been substantial recent updates in 2018 and 2019 to both the *Agricultural Land Commission Act* and the *Agricultural Land Reserve Regulations*, which affects lands designated within the Agricultural Land Reserve (ALR). Additional topic-specific updates continue to be rolled out by the ALC. Seeing as the potential lands for irrigation and the Charlie Lake wastewater treatment facility are within the ALR, a brief summary on these implications has also been included.

The requirements of the AEM Code could affect the use of reclaimed water for irrigation on agricultural lands, regardless of whether this water is sourced directly from the Charlie Lake reclaimed water storage facility or whether it is trucked off-site via the bulk filling station. Any other potential use such as in-plant uses, hydraulic fracturing, etc., will not be affected by the requirements of the AEM Code.

The purpose of this memorandum is solely to provide an update to the 2017 reclaimed water report regarding the recent legislative changes.

MEMORANDUM

Date: February 13, 2020
 File: 0601.0086.01
 Subject: Document Update – Reclaimed Water Use
 Page: 2 of 7

2. Background – Reclaimed Water Facility

Although several options were identified for the reclaimed water uses in the 2017 report, focusing on the irrigation of agricultural land, the quality expectation for this use was either moderate exposure potential or greater exposure potential, as defined in the BC Municipal Wastewater Regulation (MWR). The quality of these two types of reclaimed water are summarised in Table 2.1, below.

Table 2.1: Summary of Reclaimed Water Quality

Parameter	Greater Exposure Potential Quality	Moderate Exposure Potential Quality
CBOD ₅	≤ 10 mg/L	≤ 25 mg/L
TSS	≤ 10 mg/L	≤ 25 mg/L
Turbidity	≤ 2 NTU (average); ≤ 5 NTU (maximum)	Not applicable
Faecal Coliforms	< 1 CFU/100 mL or < 2.2 MPN/100 mL (as median of 5 consecutive samples); Maximum of 14 CFU/100 mL	100 CFU/100 mL (as median of 5 consecutive samples); Maximum of 400 CFU/100 mL
pH	6.5 to 9	6.5 to 9
Nutrients	Not applicable	Not applicable

CBOD₅: 5 day carbonaceous biochemical oxygen demand

TSS: total suspended solids

While the design of the current system is aligned with the moderate exposure potential quality for CBOD₅ and TSS, this is not the case for the higher quality needed for greater exposure potential. The 2017 report focused on the needs to meet moderate exposure potential quality standards, and indicated that disinfection was the only form of further treatment required. The cost estimates were developed on this basis. There is no requirement for nutrient treatment for either reclaimed water quality standards. In the case of irrigation uses, the reclaimed water will supply nutrients in the form of nitrogen and phosphorus, which can be used for plant growth. Although in low concentrations compared with other forms of nutrients sources (e.g. commercial fertilizers, manures, etc.), the nutrients present in reclaimed water can be sufficient to be considered as a nutrient supply for plant growth.

3. AEM Code

The AEM Code applies to all agricultural operations in BC for a basic level of environmental protection. The requirements in the AEM Code focus on preventing contaminated run-off, leachate, and solids from entering drinking water sources and other watercourses, or from crossing property boundaries. The AEM Code also aims to ensure that nutrient land application rates meet crop needs. In the case of using reclaimed water

MEMORANDUM

Date: February 13, 2020
File: 0601.0086.01
Subject: Document Update – Reclaimed Water Use
Page: 3 of 7



to irrigate agricultural land, the AEM Code outlines several requirements for nutrient application, as discussed further below.

3.1 Nutrient Land Application

The requirements for nutrient land application are intended to prevent nutrient discharge into a watercourse, across a property boundary, or below the seasonal high-water table, while ensuring that nutrient land application rates meet crop needs. Under the AEM Code, reclaimed water that is treated, provided, and used in accordance with the Municipal Wastewater Regulation (MWR) is defined as a “nutrient source”.

Nutrient sources cannot be applied to:

- Land on which there is standing water or water saturated soil.
- Ground in which the top 5 cm of soil is frozen so it is impenetrable to manually operated equipment.
- A field having at least 5 cm of ice or snow over at least half of its area.

These restrictions are consistent with the general expectation for irrigation practices, regardless of whether the water source is reclaimed water or fresh water.

The AEM Code requires that the total amount of nitrogen in the soil from all nutrient sources applied in one year must be equal to or less than the amount of nitrogen needed for optimum crop growth and yield (agronomic nitrogen application rate). Moreover, the nutrient application must consider the meteorological, topographical, and soil conditions of the area where the nutrients are applied.

For a land base area greater than 2 hectares, there is also the requirement to keep the following records with respect to each field where nutrients are applied:

- The location and size of the field.
- The crop nutrient requirements of the field.
- The crop yields of the field.
- The date and location of each application of nutrients.
- The type of nutrient sources applied.
- The calculated nutrient application rate.
- The rate at which the nutrients were actually applied.
- The result of testing conducted.

The field adjacent to the Charlie Lake wastewater treatment facility could be a location where reclaimed water is used for irrigation. This field is approximately 10 hectares in size. Therefore, this would trigger the

Date: February 13, 2020
File: 0601.0086.01
Subject: Document Update – Reclaimed Water Use
Page: 4 of 7

need for the record keeping outlined above. Should another site be selected for irrigation using reclaimed water, the area would need to be confirmed to assess whether the additional record keeping is required.

3.2 Soil Testing

Soil testing (nitrogen and phosphorus) is required when nutrients are applied to land, unless the land is less than 2 hectares in size. There are also exemptions related to flooding of a field for harvesting and the presence of organic soils. However, these conditions are not expected to apply in the general Charlie Lake area. The testing requirements focus on the presence of nitrate and available phosphorus, with the frequency to be either annually or once every three years, depending on whether the outcome of the nitrate test indicates a concentration ≥ 100 kg N/hectare. For nitrate, there are additional requirements relating to establishing the amount of nitrate-nitrogen left in the soil after plant growth has ceased. This approach focuses on the direction that applications are to be agronomic.

Should reclaimed water from the Charlie Lake wastewater treatment plant be used for irrigation, this will trigger a change to the registration under the MWR. Monitoring requirements are determined during the registration change and are set by a qualified professional based on risks to public health and the environment. Under the MWR registration, it is possible that monitoring will include soil samples before and after the growing season, at a very minimum, and the soils will be monitored for a number of parameters, in addition to nitrogen and phosphorus. Groundwater and vegetation sampling may also be required. Therefore, monitoring requirements will be largely dictated by the MWR, and the requirements in the AEM Code are not expected to represent an additional monitoring expectation.

3.3 Nutrient Management Plan

The AEM Code indicates that a nutrient management plan must be developed if all of the following conditions are met:

- The field is part of an agricultural operation having an agricultural land base totalling 5 hectares or more,
- The field is located in a vulnerable aquifer recharge area, with such areas being defined through mapping linked with the AEM Code, and
- The result of a nitrate test for the field is 100 kg N/ha or more.

This plan must be developed to limit the loss of nitrogen and phosphorus from a field to the environment. However, since the general location in and around Charlie Lake is not designated as being in a vulnerable aquifer recharge area, a nutrient management plan is not required should reclaimed water from the Charlie Lake wastewater treatment facility be used for irrigating agricultural lands.

Date: February 13, 2020
File: 0601.0086.01
Subject: Document Update – Reclaimed Water Use
Page: 5 of 7

3.4 Additional Comments

The AEM Code also indicates setback requirements for the application of nutrient sources to land. These setback requirements could also apply to the irrigation of reclaimed water. The AEM Code indicates the following setbacks for “other nutrient sources” and while the description excludes “irrigation water” there is no reference to the setbacks excluding “reclaimed water”. Both types of water are listed separately in the definitions section of the AEM Code.

- 30 m from a well or diversion point used as a drinking water source.
- 3 m from any other drinking water source.
- 3 m from a water course. A water course in the AEM Code is defined as an area of land which perennially or intermittently contains surface water. This excludes puddles, dug-out ponds for livestock watering, and furrows, grassed waterways and other temporary ponded areas that are normally farmed.
- No application on the property boundary.

With the nature of the depressions observed on the adjacent field, it is reasonable to assume that any surface water in these depressions would not be considered to be a watercourse.

There are also setback requirements in the MWR for the use of reclaimed water for irrigation, with a standard setback of 30 m being required for wells/in-ground domestic water sources. There are also standard requirements to ensure that the reclaimed water does not migrate off a property. Therefore, any additional requirements in the AEM Code regarding setbacks are expected to have minimal impacts on existing reclaimed water practices under the MWR for irrigation of agricultural lands.

4. Agricultural Land Commission

The Agricultural Land Commission (ALC) and its legislation is of utmost importance in considering any land use decisions for lands that fall within the ALR. This importance is further noted within the Agricultural Land Commission Act (ALC Act) s. 2, which speaks to which other pieces of legislation that the ALC Act is subject to. Because of the weight placed on protecting BC’s limited high-quality farmland, the ALC Act is not subject to any other enactment, with the exception of the following:

- Interpretation Act;
- Environment and Land Use Act; and
- Environmental Management Act.

It should be noted that the Charlie Lake wastewater treatment facility is registered under the Municipal Wastewater Regulation, which falls under the Environmental Management Act. The facility is located on lands designated as being within the ALR, and was not excluded from the ALR when the original lagoons

MEMORANDUM

Date: February 13, 2020
File: 0601.0086.01
Subject: Document Update – Reclaimed Water Use
Page: 6 of 7



were constructed. It is not known if this land has received a non-farm use designation to accommodate the construction and operation of a domestic wastewater treatment facility. Such records may be available within the Peace River Regional District archives.

In a review of the ALC Act, the Agricultural Land Reserve General Regulations and the Agricultural Land Reserve Use Regulations, there does not appear to be any references made to domestic wastewater treatment systems and how they are treated within the ALR. Furthermore, domestic wastewater treatment systems are not identified as a permitted use or a non-farm permitted use, however various linear infrastructure elements, such as connecting pipe-works, are.

In addition to this, the Agricultural Land Reserve Use Regulation specifically sets out regulations as they relate to irrigation use of ALR lands in the **Infrastructure** and **Permitted soil or fill uses** sections. The relevant sections are as follows:

25 The following uses of agricultural land are permitted but may be prohibited as described in section 20:

(b) constructing, maintaining and operating, for the purpose of drainage or irrigation or to combat the threat of flooding,

(i) dikes and related pumphouses, and

(ii) ancillary works, including access roads and facilities.

35 Subject to Section 36 [*prohibited fill*], the removal of soil from, or the placement of fill on, agricultural land for one or more of the following purposes is permitted if all applicable conditions are met:

(c) constructing or maintaining flood protection dikes, drainage, irrigation and livestock watering works for farm use, if the total annual volume of soil removed or fill placed is 320 m³/16 ha or less;

While the ALC Act and its regulations are silent with respect to any regulations related to domestic wastewater treatment systems, the regulations do make provisions relating to irrigation. Furthermore, as the ALC Act has seen recent updates that are fairly significant in nature, the PRRD may wish to seek further clarification from the ALC prior to beginning any additional activities on the subject parcel to ensure that the uses proposed are indeed permitted within the ALR and in compliance with the ALC Act and its regulations.

5. Summary and Recommendations

An assessment was completed in 2017 to evaluate the production of reclaimed water at the Charlie Lake wastewater treatment facility, with one of the potential uses of the reclaimed water to irrigate agricultural land. With the recent changes in legislation, it is expected that the new AEM Code will have little impact on irrigation practices given the following:

- The requirements in the MWR and the standard practices which are associated with the use of reclaimed water for irrigating agricultural lands.

MEMORANDUM

Date: February 13, 2020
File: 0601.0086.01
Subject: Document Update – Reclaimed Water Use
Page: 7 of 7



- The Charlie Lake area is not located within a vulnerable aquifer recharge area.

However, should irrigation of agricultural lands with reclaimed water be pursued by the Peace River Regional District, and any parcel or irrigated land be greater than 2 hectares in size, there will be the need to confirm that the appropriate records are being kept in accordance with the Section 51 of the AEM Code. While it is expected that the records identified in this Section of the AEM Code should be relatively consistent with the monitoring and record requirements under the MWR, this may not be the case.

The introduction of the AEM Code should not result in any implications which could affect the engineering design or the operation of a reclaimed water facility at the Charlie Lake wastewater treatment facility. This is on the assumption that nutrient applications to an agricultural land can be managed by considering all sources, with the application rates to be managed accordingly. This would negate the requirement to implement nutrient treatment at the Charlie Lake wastewater treatment facility.

Given the power of the ALC Act in BC legislation, it would be beneficial to consult with the ALC to ensure compliance with their legislation prior to proceeding with any activities associated with this project.

6. Closing

We trust that the above information provides sufficient guidance as to the recent legislation changes and the potential implications should reclaimed water from the Charlie Lake wastewater treatment facility be used to irrigate agricultural lands. However, please do not hesitate to contact us if you require clarification or additional information.

Sincerely,

URBAN SYSTEMS LTD.

A handwritten signature in black ink, appearing to read "Adrianna Johnson".

Adrianna Johnson, B.Sc.
Environmental Consultant

A handwritten signature in blue ink, appearing to read "Joanne Quarmby".

Dr. Joanne Quarmby, R.P.Bio.
Water and Wastewater Specialist

/aj/jq