From:	Ashley Haigh
To:	Sagan, Barsha
Cc:	Victor Kleinsasser
Subject:	RE: Additional information request for Crystal Spring Colony Wastewater Treatment Lagoon EAP regarding biosolid land application
Date:	December 20, 2024 2:22:52 PM
Attachments:	image001.png

Good afternoon Barsha,

The colony farms more than 3700 acres within a 10km radius of the proposed lagoon which biosolids could be applied to for future disposal.

Regards,

Ashley Haigh, P.Eng.
Civil Engineer

BURNS MAENDEL
CONSULTING ENGINEERS LTD.

903 Rosser Avenue
Brandon, MB R7A 0L3
Tel: 204.728.7364 Ext. 116
Fax: 204.728.4418
a.haigh@bmce.ca

BMCE will be closed for the Holiday's after December 20th and will reopen on January 6th. Merry Christmas!

From: Sagan, Barsha <Barsha.Sagan@gov.mb.ca>
Sent: December 20, 2024 12:54 PM
To: Ashley Haigh <a.haigh@bmce.ca>
Cc: Victor Kleinsasser <victor@crystalspringhb.com>
Subject: Additional information request for Crystal Spring Colony Wastewater Treatment Lagoon EAP regarding biosolid land application

Good day,

Please confirm that the proponent will have sufficient and suitable land available for biosolid land application when sludge from the proposed wastewater lagoon needs to be removed in future.

Thank you.

Regards,
Barsha Sagan
204-795-7175

From: Ashley Haigh
To: Sagan, Barsha
Subject: RE: Crystal Spring Colony Wastewater Treatment Lagoon
Date: December 10, 2024 11:37:20 AM
Attachments: image001.png

Hi Barsha,

I'm not sure this response was sent to me; can you confirm what day you sent it so that I could verify if I missed something or if our server rejected the email for some reason? Thanks.

I will also respond to this comment:

The *Lake Manitoba and Lake Martin Regulation Review – Finding the Right Balance: A Report to the Minister of Infrastructure and Transportation* dated February 2013 concluded that *"Based on an analysis of past floods, the return period for the 2011 peak flow on the Assiniboine River is 1 in 220-years. With climate change, the frequency might increase to 1 in 150-years. However, a flood of this magnitude will still be very rare."*

A quantitative analysis of climate change impacts to the hydraulic loading of a lagoon is not currently a requirement of lagoon approvals in Manitoba through MECC, however the MTI Committee recommended that the lagoon berms be constructed to withstand the 1 in 200-year storm event flood protection level, therefore the lagoon berms have been designed with a 0.44m freeboard above this level. The *Manitoba 2011 Flood Review Task Force Report to the Minister of Infrastructure and Transportation* dated April 2013 concluded that *"the 200-year flood may provide an appropriate balance between long term risk tolerance and uncertainty with estimation of flows and levels from limited hydrologic data"* for this area and that *"the effects of flooded lagoons tended to be of a local impact during the flood [of 2011] and of short duration… for the most part, the large volume of water associated with the flooding served to dilute the concentrations of the raw sewage."*

Per A5 in BMCE's response to the TAC comments and questions, the lagoon will only be discharged between June 15 to November 1 during the dry season. If flooded conditions are present, the lagoon will not be discharged. The lagoon has also been designed with 1.0m of freeboard to allow for additional storage under emergency conditions. 1.0m of freeboard equates to approximately 31,496 m3 of emergency storage between both cells (294 days worth of storage at the maximum hydraulic loading rate), which allows for ample time in the event of a flood to allow for water levels to receed prior to discharge.

Regards,

Ashley Haigh, P.Eng.
Civil Engineer

Q87: On pdf page 21, the pH of the lagoon effluent ought to remain within 6.5 – 9.0 for the protection of aquatic life. Can the proponent please provide the anticipated concentrations (Total Ammonia Nitrogen as N, BOD, TSS, Total Phosphorous) in Willow Creek downstream of effluent discharge, during the two-week trickle discharge and provide a comparison with the Manitoba Water Quality Standards, Objectives and Guidelines? This assessment will be helpful to assess and ensure the protection of aquatic life in Willow Creek.

A87: Using the WSC gauge 05SB002 on Willow Creek, and assuming discharge will take place in June and September, the average flows in Willow Creek were recorded to be 416 L/s and 49 L/s, respectively. The maximum discharge from the lagoon during a trickle discharge will be approximately 14 L/s (refer to A76).

Average water quality data collected and available from the East Interlake Watershed District for Willow Creek between 2008 and 2019 was collected for this evaluation. If we consider that the lagoon will treat wastewater to achieve discharge criteria (maximum allowable constituent concentrations) and that the full flow from the lagoon will reach Willow Creek (and not be absorbed or polished by the 1.1 km of drainage ditch along the South Malonton Drain), the adjusted concentrations in Willow Creek are summarized in the Table below.

Concentrations in Willow Creek combined with lagoon discharge were calculated using the following equation:

$$C_3 = \frac{(C_1V_1 + C_2V_2)}{(V_1 + V_2)}$$

Where: C_3 = the combined concentration of Willow Creek and lagoon effluent,
C_1 = the average concentration in Willow Creek,
C_2 = the maximum concentration in the lagoon effluent,
V_1 = the average volume of flow in Willow Creek, and
V_2 = the average discharge volume from the lagoon.

Combined pH concentrations were calculated using the following equation:

$$pHc = 14 - \left[-\log\left(\frac{\left(V_2\ x\ (1x10^{-pH2})\right) - \left(V_1\ x\ \left(1x10^{-(14-pH1)}\right)\right)}{V_1 + V_2}\right)\right]$$

Where: pH_c = the combined pH of Willow Creek and lagoon effluent,
pH1 = the average pH in Willow Creek,
pH2 = the minimum pH in the lagoon effluent,
V_1 = the average volume of flow in Willow Creek, and
V_2 = the average discharge volume from the lagoon.

Tested Constituents	Average Willow Creek Concentrations[1]	Maximum Lagoon Effluent Concentration[2]	Concentration with Lagoon Discharge in June	Concentration with Lagoon Discharge in September	Objectives for Aquatic Life[6]
Ammonia, as N (unfiltered)	0.076 mg/L	1.25 mg/L	0.11 mg/L	0.34 mg/L	<0.47 mg/L[4]
BOD_5	2.98 mg/L	25 mg/L[5]	3.70 mg/L	7.87 mg/L	N/A
$CBOD_5$	Not Measured	25 mg/L	-	-	N/A
E. Coli.	91.8 cfu/100mL	200 cfu/100mL	95.3 cfu/100mL	115.8 cfu/100mL	N/A
pH	8.27	6.0	8.25[3]	8.09[3]	6.5-9.0
Total Coliforms	987.5 cfu/100ml	200 cfu/100mL	961.9 cfu/100mL	812.5 cfu/100mL	N/A
Total Phosphorus	0.06 mg/L	1 mg/L	0.09 mg/L	0.27 mg/L	N/A
TSS	40.3 mg/L	25 mg/L	39.8 mg/L	36.9 mg/L	<250 mg/L

1: East Interlake Watershed District (EIWD). 2021-03-18. "East Interlake Watershed District Quarterly Sampling" (dataset). 2.0.0. DataStream. https://datastream.org/en-ca/dataset/b34683c1-a932-4713-b68a-200b5dc94b38.
2: Provided in the *Design Objectives for Wastewater Treatment Lagoons*.
3: Calculated using stoichiometric equations for the combination of a weak acid [H^+] and base [OH^-].
4: Acceptable values range from 0.47 to 48.83 mg/L depending on pH and temperature; lowest conservative value was used.
5: No such limit exists within the *Design Objectives for Wastewater Treatment Lagoons*. Value provided by the *Manitoba Water Quality Standards, Objectives and Guidelines* for facilities serving the food processing industry or producing high levels of total nitrogen (**not applicable to this lagoon**, shown for reference only).
6: Provided in the *Manitoba Water Quality Standards, Objectives and Guidelines.*

As we can see, the maximum concentrations within Willow Creek, applying conservative assumptions, do not exceed the objectives for aquatic life. In reality, the lagoon effluent concentrations will be lower than the maximum discharge concentrations and will also be absorbed and further polished along the South Malonton Drain prior to Willow Creek. In addition, the Department of Fisheries and Oceans permits domestic wastewater lagoons to discharge to fish bearing water bodies, so long as the maximum lagoon effluent concentrations are not exceeded, refer to A1.

From:	Ashley Haigh
To:	Sagan, Barsha
Cc:	Daniel Burns; Victor Kleinsasser
Subject:	RE: Additional information request related to surface water quality for File 6193.00 – Crystal Spring Colony Wastewater Treatment Lagoon
Date:	July 9, 2024 4:15:53 PM
Attachments:	image001.png

Hi Barsha,

At full capacity, the lagoon has been designed to discharge a maximum volume of 17048m3 in the spring and 10,006m3 in the fall, totalling 27,054m3 or 27,054,000L per year. A discharge containing 1mg/L would equate to 27.05 kg/year. This is of course still assuming that there is no absorption or phosphorus uptake by the natural vegetation in the 1.1km of ditch prior to Willow Creek.

I also wanted to let you know that I am aware BMCE still has two outstanding TAC requests for this lagoon regarding the weeping tile flows and 200-year flood protection level. I am hoping to have these addressed shortly.

Regards,

Ashley Haigh, P.Eng.
Civil Engineer

BURNS MAENDEL
CONSULTING ENGINEERS LTD.

903 Rosser Avenue
Brandon, MB R7A 0L3
Tel: 204.728.7364 Ext. 116
Fax: 204.728.4418
a.haigh@bmce.ca

Summer Hours beginning May 13th, 2024:
Monday-Thursday – 7am to 5pm
Friday – 8am to 12pm

From: Sagan, Barsha <Barsha.Sagan@gov.mb.ca>

Sent: Tuesday, July 9, 2024 3:57 PM
To: Ashley Haigh <a.haigh@bmce.ca>
Cc: Daniel Burns <d.burns@bmce.ca>; Victor Kleinsasser <victor@crystalspringhb.com>
Subject: Additional information request related to surface water quality for File 6193.00 – Crystal Spring Colony Wastewater Treatment Lagoon

Thank you for the information. I have a follow up inquiry related to this topic.

If the facility is required to meet a 1 mg/L total phosphorus standard at the secondary cell discharge point, and the effluent concentration was 1.0 mg/L TP, what would be the annual total phosphorus loading rate (kg/year) to Willow Creek under maximum wastewater lagoon design capacity?

Thank you.

Regards,
Barsha Sagan, M.A.Sc., P.Eng. (she/her)
A/Senior Engineer
Industrial and Wastewater Section | Environmental Approvals Branch | Manitoba Environment and Climate Change | Box 35 – 14 Fultz Boulevard, Winnipeg, MB R3Y 0L6 | Tel: (204) 795-7175

From: Ashley Haigh <a.haigh@bmce.ca>
Sent: Thursday, June 27, 2024 3:02 PM
To: Sagan, Barsha <Barsha.Sagan@gov.mb.ca>
Cc: Daniel Burns <d.burns@bmce.ca>; Victor Kleinsasser <victor@crystalspringhb.com>
Subject: RE: Additional information request related to surface water quality for File 6193.00 – Crystal Spring Colony Wastewater Treatment Lagoon

Good afternoon Barsha,

In order to maintain the average total phosphorus concentration in Willow Creek of 0.06 mg/L, the maximum concentration of the lagoon effluent must also be 0.06 mg/L (or less).

Regards,

Ashley Haigh, P.Eng.
Civil Engineer

BURNS MAENDEL
CONSULTING ENGINEERS LTD.

903 Rosser Avenue
Brandon, MB R7A 0L3
Tel: 204.728.7364 Ext. 116
Fax: 204.728.4418
a.haigh@bmce.ca

Summer Hours beginning May 13th, 2024:
Monday-Thursday – 7am to 5pm
Friday – 8am to 12pm

From: Sagan, Barsha <Barsha.Sagan@gov.mb.ca>
Sent: Friday, June 21, 2024 2:47 PM
To: Ashley Haigh <a.haigh@bmce.ca>
Cc: Daniel Burns <d.burns@bmce.ca>; Victor Kleinsasser <victor@crystalspringhb.com>
Subject: Additional information request related to surface water quality for File 6193.00 – Crystal Spring Colony Wastewater Treatment Lagoon

Good day Ashley,

Please confirm the estimated total phosphorous (TP) concentration in the wastewater effluent to maintain the average concentrations of total phosphorous (TP) as (0.06 mg/L) in Willow Creek.

Thank you.

Regards,
Barsha Sagan (she/her)
Department of Environment and Climate Change; Phone: 204-795-7175