March 18, 2016 Project No: 141-21811-00

Mr. Asit Dey, P.Eng.
Environmental Engineer
MANITOBA CONSERVATION AND WATER STEWARDSHIP
160-123 Main Street
Winnipeg, MB R3C 1A5

Dear Mr. Dey:

RE: R.M. OF MACDONALD - COMMUNITY OF SANFORD
WASTEWATER STABILIZATION POND EXPANSION
ENVIRONMENT ACT PROPOSAL – FILE No: 1921.10

This letter intends to address the email sent by Mr. Asit Dey, dated March 15, 2016, and is attached at the end of this document. In this email, it is stated that the solid portion of the wastewater collected in septic tanks is to be considered as septage. As such, the design calculations for the present and future organic loadings will need to be updated.

The following table lists the properties used to update the present and future organic loadings:

	Current Design Parameters	Future Design Parameters
Population	852	1460
Population per Dwelling	2.65	2.65
Number of Dwellings	321	551
Number of Septic Tanks	321	551
Septage Strength	5000 mg/L BOD_5	5000 mg/L BOD_5
Percent BOD_5 Removed in Suspended Solids	40%	40%

Currently, the population of Sanford is considered to be 852, situated within 321 dwellings. It is assumed that each dwelling has one septic tank, thus 321 septic tanks. Each tank is emptied once a year by the R.M. of Macdonald, between the dates of June 1 and October 15. The organic loading quantity per tank is derived from the EPA Handbook on Septage Treatment and Disposal, Table 3-4. It states that there is on average 5000 mg/L BOD_5 per tank. Generally speaking, the EPA Handbook suggests using a design value of 7000 mg/L BOD_5, but that value takes into consideration that some tanks are not emptied once per year. During the design process of the Mitchell Lagoon in 2004, Manitoba Water Services Board (MWSB) personnel reported that they had sampled some trucks with septage and the lab results ranged from 4000 – 4500 mg/L BOD_5. Accordingly, since the R.M. of Macdonald ensures that each tank is emptied once a year and the average BOD_5 values reported by MWSB were found to be less than 5000 mg/L, a septage strength of 5000 mg/L BOD_5 is appropriate for this application. On average, the sedimentation chamber for each tank is approximately 500 imperial gallons or 2,250 L. Therefore, each tank will contribute approximately 11.5 kg-BOD_5. Since there are currently 321 tanks, there will be a total of 3,691.5 kg-BOD_5 contributed to the lagoon during the 135 day hauling period. Consequently, the daily average organic loading rate is calculated to be **27.34 kg-BOD_5/day**.

The liquid portion of the wastewater in each septic tank is sent to the lagoon via the Community's low pressure sewer system. Typical septic tank BOD_5 removal efficiencies are 30 to 50 percent, with a well-functioning septic tank reducing the BOD_5 by 40 percent (EPA, 2002). Thus, it is considered that this liquid portion of the wastewater contributes 60% of the total BOD_5. Since it is readily considered that each individual person contributes 0.077 kg-BOD_5/day, the liquid portion of the wastewater can be assumed contribute 0.046 kg-BOD_5/day per individual (60% of the total BOD_5). Therefore, the daily average organic loading for the liquid portion of the wastewater is calculated to be **39.19 kg-BOD_5/day**.

As a result, the current total daily average organic loading is **66.53 kg-BOD_5/day**, slightly up from the previous calculated total of 65.60 kg-BOD_5/day.

Utilizing the future design parameters, listed in the aforementioned table, the daily average organic loading rate for the solids portion of the wastewater is calculated to be **46.59 kg-BOD_5/day**. The daily average organic loading rate for the liquids portion of the wastewater is calculated to be **67.16 kg-BOD_5/day**. As a result, the future total daily average organic loading is **113.75 kg-BOD_5/day**, slightly up from the previous calculated total of 112.42 kg-BOD_5/day.

The converted primary cell is sized to a liquid surface area of 3.625 ha at its maximum operating depth. This corresponds to an organic treatment capacity of 203 kg-BOD_5/day. Thus applying the future organic loading rate of 113.75 kg-BOD_5/day, the converted primary cell will be at 56% capacity, when the Community of Sanford reaches a population of 1460.

Another factor to consider is the maximum allowable amount of tanks to be emptied into the converted primary per day. It is considered that the maximum allowable organic loading is 56 kg-BOD_5/day per ha. As previously stated, the converted primary cell has a liquid surface area of 3.625 ha and each tank contributes 11.5 kg-BOD_5. As a result, the maximum amount of tanks that can currently be emptied into the converted primary cell per day without violating the maximum organic loading is **14 tanks**. In the future, the number of tanks that can be emptied into the converted primary cell per day is **11 tanks**.

The following table summarizes the content of this letter:

	Current Organic Loading	Future Organic Loading
Organic Loading Of Solids	27.34 kg-BOD_5/day	46.59 kg-BOD_5/day
Organic Loading Of Liquids	39.19 kg-BOD_5/day	67.16 kg-BOD_5/day
Total Organic Loading	66.53 kg-BOD_5/day	113.75 kg-BOD_5/day
Previously Calculated Organic Loading	65.60 kg-BOD_5/day	112.42 kg-BOD_5/day
Maximum Number Of Tanks Emptied Per Day	14	11

The changes to the current and future daily average organic loading are not significantly different from what was previously calculated. The Sanford Lagoon Expansion will still be limited by the storage capacity of the expanded lagoon (71,290 m^3), which can accommodate a population of up to 1,460.

Best regards,

WSP Canada Inc.

Dana Bredin, P.Eng.
Geotechincal / Civil Engineer

Reviewed by: Ross Webster, P.Eng
Manager, Environmental Infrastructure

cc: Mr. Daryl Hrehirchuk – CAO, R.M. of Macdonald
Mr. Grant Baker – Public Works, R.M. of Macdonald

Bredin, Dana

From: Dey, Asit (CWS) <Asit.Dey@gov.mb.ca>
Sent: March-15-16 1:34 PM
To: Bredin, Dana
Cc: Webster, Ross; CA - WinnipegFiling; gbaker@rmofmacdonald.com; Daryl Hrehirchuk; Burland Ross, Siobhan (CWS); Boswick, Robert (CWS); Webb, Bruce (CWS)
Subject: 2016-03-15_Additional Information Request_Sanford Lagoon EAP-Clarification Letter_Our File No. 1921.10 [WSP# 141-21811-00]

Follow Up Flag: Follow up
Flag Status: Completed

Hello Dana,

Good afternoon. Receipt of your submission dated March 14, 2016 is hereby acknowledged.

It was stated in your March 14, 2016 clarification letter that the existing Sanford Lagoon receives truck-hauled wastewater from the Community of Sanford only. The lagoon receives the liquid portion of the wastewater from the Community's low-pressure sewer system via a lift station and forcemain. The solids portion of the wastewater collects in septic tanks, which are emptied and hauled to the Lagoon once a year during the summer months.

In Environment Act Licences, septage is defined as: "**"septage"** means the sludge produced in individual on-site wastewater disposal systems such as septic tanks"

Therefore, the solid portion of the wastewater collected in septic tanks will be considered as septage. For this reason, you are requested to update the design calculations for organic loading with the organic loading contribution from septage. In addition, please comment on whether the organic loading in the Converted Primary Cell will be consistently within the maximum allowable 56 kg BOD5/day/ha requirement.

If you need any additional information or clarification, please feel free to contact me.

Thanks,

Regards,

Asit Dey
T: (204) 945-2614 F: (204) 945-5229
Email: asit.dey@gov.mb.ca

From: Bredin, Dana [mailto:Dana.Bredin@wspgroup.com]
Sent: March-14-16 3:10 PM
To: Dey, Asit (CWS)
Cc: Webster, Ross; CA - WinnipegFiling; gbaker@rmofmacdonald.com; Daryl Hrehirchuk
Subject: Sanford Lagoon EAP - Clarification Letter [WSP# 141-21811-00]

Hi Asit,

Please find attached a letter clarifying a paragraph in Section 3.1, regarding outside truck-hauled wastewater and septage.

Best regards,

Dana Bredin, P.Eng
Geotechnical / Civil Engineer

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