Dey, Asit (CWS)

From: Jason Cousin
Sent: August-04-15 1:56 PM
To: Dey, Asit (CWS)
Cc: Burland Ross, Siobhan (CWS)
Subject: RE: Request for Additional Information_File 5774.00 Dauphin River First Nation Wastewater Treatment Lagoon

Asit,

Below are the responses to the questions on the Dauphin River First Nation Lagoon EAP.

1. **Manitoba Conservation and Water Stewardship – Groundwater Management Section**

As indicated in the submitted EAP, additional geotechnical investigation titled: Geotechnical Investigation Water, Sewer and School Project, Dauphin River First Nation, Manitoba, was carried out by Amec Foster Wheeler Environment and Infrastructure between March 31, 2015 and April 08, 2015. The following list provides a quick reference to the section in the document that relates to the lagoon site and the laboratory results indicating that the available clay is expected to meet design requirements when remoulded:

- Table 1, Page 4: Number of test pits and ID
- Table 3, Page 8: Summary of remolded hydraulic conductivity test results
- Figure 2: Test Hole and Probe Locations Plan
- 4.1 Discussion and Recommendations, Lagoon. Page 12 to 15.

"The test holes in close proximity to the proposed Lagoon (L2 to L8) primarily consisted of around 1.5 m to 2.1 m of peat underlain by 1.5 m to 3.0 m of medium to high plastic clay and clay till to the depths explored (4.6 m). Amec Foster Wheeler field staff collected bulk samples of the clays between 1.5 m and 3.0 m below grade for testing of remoulded hydraulic conductivity. Based on hydraulic conductivity tests conducted on the three remoulded samples compacted to 96% of its SPMDD, the average hydraulic conductivity was determined to be of 7.92 x 10^{-9} cm/sec. Therefore, remoulded clay from the site is expected to meet Manitoba Conservation's requirements of a minimum hydraulic conductivity of 1 x 10^{-7} cm/sec.

An additional hydraulic conductivity test was also performed on a Shelby tube sample from the native clay at a depth of 3.1 to 3.7 m below grade at test hole L12, located about 230 m northeast of the proposed Lagoon footprint. The hydraulic conductivity was determined to be 9.39 x 10^{-9} cm/sec. The test result indicates that the native clays below the surrounding peat in the proposed lagoon area likely have hydraulic conductivity that meets Manitoba Conservation's requirements. However, regardless of hydraulic conductivity, it should be noted that the shallow clay thickness encountered in some test holes below the lagoon design base elevation (i.e. 222 m), such as test hole L08 (300 mm of clay) and test hole L06 (800 mm of clay). In these instances, utilizing the native clays as the natural liner without rework for the lagoon is not recommended. Rework of the compacted clay liner would allow the identification of unsuitable soils (i.e. more permeable soil such as till) and thin clay, thus allowing a consistency of liner construction and performance.

Below is a link to our FTP site containing the Geotechnical Investigation completed by AMEC.

http://www.jrcc.ca/DR/Geotechnical%20Investigation%20-%20DRFN.pdf

2. **Manitoba Conservation and Water Stewardship – General Land Use**

A) The peat layer removed from the lagoon footprint will be stockpiled on site, adjacent to the lagoon construction area.

B) Through the additional geotechnical investigation, the quality of the clay is suitable for a lagoon liner construction. If there is a shortage of clay within the lagoon cell floor, a borrow pit will be constructed adjacent to the lagoon. The test holes L1 to L12 (Figure 2 and Appendix A: Soil logs) cover an area larger than the lagoon footprint and indicate the presence of suitable clay.
C) Under Section 2.1 Land Title/Location, of the submitted EAP, JRCC indicated that an application has been submitted to the Manitoba Crown Lands & Property Agency for a permit to be issued to use the site for the construction and operation of the lagoon.

3. Manitoba Conservation and Water Stewardship – Environment Compliance and Enforcement

A) The proposed drainage route collects runoff water from the lagoon perimeter and directs it along the access road to the East. The site drainage will connect to the existing Provincial Road 513 drainage ditch. This existing ditch flows North-East along the road until it is diverted East under the road through a culvert. Once through the road, the existing ditch turns South-East and arcs through the tree line and enters into the river. Please refer to the attached updated plan.
B) The proposed Waste Transfer Station will no longer be located adjacent to the lagoon site.

4. Manitoba Conservation and Water Stewardship – Environment Approvals Branch

Both the South Reserve Parcel and CDR populations were assumed to be serviced by septic tanks. In design year 20, there will be a total of 23 houses on septic tanks (six in the South Reserve Parcel and 17 in the CDR). The average septic tank volume was assumed to be 4,500 L (1,000 Imp. gal.). When septic tanks are pumped out, the highly concentrated septage (sludge) and domestic sewage present in the tank at that time are pumped out together. Therefore the average hydraulic loading per pump out is equal to the tank size. Septic tanks are pumped out on average once per year. Based on an assumed allowable haulage period of 135 days, this corresponds to approximately 0.17 tanks/day being hauled to the proposed lagoon (23 / 135 = 0.17). For design purposes, it will be assumed one tank per day will be hauled to the proposed DRFN lagoon.

To calculate the total load produced by the septic tanks per day, the concentration or organic strength of the two components (septage and domestic sewage) inside the septic tank and their respective volumes is required.

Typically, septage (sludge) from a septic tank has a larger organic load than wastewater discharged to a gravity sewer system. The organic strength was calculated based on a septage concentration of 7.0 kg BOD_5/m^3 (Source: Ontario-MOE Design Guidelines for Sewage Works 2008) and a domestic sewage concentration in the septic tank of 0.486 kg BOD_5/m^3.

Considering a population of 80 people between the South Reserve Parcel and CDR and a total of 23 houses, the average density is 3.48 people/house. The typical septage generation rate of 200 L/person/year (Source: US EPA - Guide to Septage Treatment and Disposal - 2.1. 1994) multiplied by the population density indicate that on average 695.7 L (3.48x200=695.7) of septage are generated per house during one year. This volume multiplied by the 7.0 kg BOD_5/m^3 concentration provides a total Septage Load of 4.9 kg BOD_5/tank. (695.7*7/1000=4.9)

The remaining volume of the septic tank (4,500L minus 695.7 L equals 3,804.3 L) is filled by the domestic sewage. This volume multiplied by the 0.486 kg BOD_5/m^3 concentration calculated before provides a total Domestic Sewage Load of 1.8 kg BOD_5/tank. (3,804.3*0.486/1000=1.8)
Therefore, the Total Load produced by a septic tank per day is 4.9 kg BOD_5 (septage) plus 1.8 kg BOD_5 (domestic sewage) equals 6.7 kg BOD_5.

As discussed last week, please provide a copy of the Draft Licence for our review.

If you have any further questions, please do not hesitate to give me a call.

Jason Cousin, P. Eng.
Municipal Engineer

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