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October 21, 2016

File No. 16-0429-004

Department of Sustainable Development
Environmental Approvals Branch
Government of Manitoba
Box 80, 160-123 Main Street
Winnipeg, Manitoba
R3C 1A5

ATTENTION: Mr. Asit Dey
Environmental Engineer

RE: Request for Additional Information:
Town of Melita Land Application of Biosolids - File 108.30

Dear Mr. Dey:

Additional information regarding the Environment Act Proposal (EAP) for the Town of Melita land application of biosolids as per your emails to Shaun Moffatt on October 18, 2016 and October 20, 2016 follows. The questions are answered in order.

Bullets 1 & 2: Using the available portion of the total phosphorus, the N:P ratio for the primary and secondary cells is 2.7:1 and 10.24:1, respectively. Crop removal for most crops (cereals and oilseeds) usually ranges from 3:1 to 4:1. Using an N based application rate, there will be little accumulation of plant available P in the fields. Soils contain large portions (over 500X the available or solution P) in the fixed P form that is unavailable to the plant. Due to the high pH (>7) of these soils, the high levels of calcium in the soil with react with the phosphorus which will result in a decrease in solubility and availability of phosphate from the biosolids. The insoluble unavailable phosphorus added from the biosolids will gradually mineralize over many years at roughly 1-2% per year depending on weather and microbial activity. The soil test results show that the fields are very low to medium range in Olsen-P phosphorus and are well below the 60 ppm threshold. Phosphorus is not a limiting factor for the proposed spreading rates.

Updated calculations for Table 8 and Table 11 using total phosphorus are provided below.

Table 8 – Biosolid Characteristics (Nitrogen and Phosphorus) for Primary and Secondary Cells

Name	Description	Unit	Primary Cell Results	Secondary Cell Results
Volume (Plus 10%)	Field	m3	20,000	10,000
Specific Gravity	As Received	Kg/L	1.04	1.08
Moisture	As Received	%	92.8	84
Nitrogen Characteristics				
Total Kjeldahl N	% Dried Basis	%	0.53	0.68
Total Kjeldahl N	Dried Basis	mg/kg	5,300	6,800
Total Kjeldahl N	Dried Basis	lbs/1000 imp. gal	53	68
Ammonium N	Dried Basis	mg/kg	1,030	316
Ammonium N	Dried Basis	lbs/1000 imp. gal	10.3	3.16
Available Nitrate	Dried Basis	mg/kg	0	0
Available Nitrate-N	Dried Basis	mg/kg	0	0
Organic N	Dried Basis	mg/kg	4,270	6,484
Organic N	Dried Basis	lbs/1000 imp. gal	42.7	64.84
Application Method			Injection	Injection
Anticipated Weather			Cool/Wet	Cool/Wet
Anticipated Volatilization			0%	0%
Available Organic N	Dried Basis	lbs/1000 imp. gal	10.68	16.21
Available Ammonium N	Dried Basis	lbs/1000 imp. gal	10.3	3.16
Total Available N (Year 1)	Dried Basis	lbs/1000 imp. gal	20.98	19.37
Mineralization N (Year 2)	Dried Basis	lbs/1000 imp. gal	5.12	7.78
Mineralization N (Year 3)	Dried Basis	lbs/1000 imp. gal	2.56	3.89
Phosphorus Characteristics				
Total Phosphorus	Dried Basis	mg/kg	5,440	2,870
Total Phosphorus	Dried Basis	lbs/1000 imp. gal	54.4	28.7
P2O5 (P * 2.3)	Dried Basis	lbs/1000 imp. gal	125.1	66
Total Available P2O5	Dried Basis	lbs/1000 imp. gal	7.69	1.89
C:N Ratio				
Total Organic Carbon	Dried Basis	%	1.71	2.1
C:N Ratio	Dried Basis	X:1	3.23	3.09
N:P Ratio	Dried Basis	X:1	0.16	0.29
N:P (Available) Ratio	Dried Basis	X:1	2.7	10.24
pH	Saturated Paste		6.7	7.4

Source: Tri-Provincial Manure Application and Use Guidelines, 2004 and MMM Group, 2013.

Table 11 – Application Rate Calculation Worksheet (Imperial Units)

Name	Unit	Primary Cell	Secondary Cell
Nitrogen Based Application Rate			
Total Kjeldahl N	lbs/1000 imp. gal	53	68
Ammonium N	lbs/1000 imp. gal	10.3	3.16
Available Nitrate-N	lbs/1000 imp. gal	0	0
Organic N	lbs/1000 imp. gal	42.7	64.84
Application Method		Injection	Injection
Anticipated Weather		Cool/Wet	Cool/Wet
Anticipated Volatilization		0%	0%
Available Organic N	lbs/1000 imp. gal	10.68	16.21
Available Ammonium N	lbs/1000 imp. gal	10.3	3.16
Total Available N	lbs/1000 imp. gal	20.98	19.37
Fall Application Adjustment (Total Available N * 83%)		17.41	16.08
N based Rate	imp. gal/acre	11,000	11,800
Total N Applied	lbs/acre	190	190
Total P2O5	lbs/1000 imp. gal	125.1	66
Total Available P2O5	lbs/1000 imp. gal	7.69	1.89
Amount of Total P2O5 applied	lbs/acre	1,376.1	778.8
Amount of Available P2O5 applied	lbs/acre	206.5	116.8
Crop Removal Rate	lbs/acre	47	47
Area of Land Required	acres	385	199

Bullet 3: Regarding the maximum allowable nutrient application of biosolids within the top 15 cm of land, in Appendix B of the EAP, Tone Ag note that regulations came into effect on November 10, 2013 restricting the amount of allowable phosphorous in the soil. Fields with soil P levels > 60 ppm (120 lbs/acre) are to be applied on the basis of crop removal of P in zones between N1 and N3. 60-120 ppm equals 2X crop P removal and 120-180 ppm equals 1x crop P removal application rates.

Based on the regulations, it is stated on page 21 of the EAP, the target N rate will be 190 lbs/acre in order to grow a 75 bushel wheat crop or 55 bushel canola crop. This will allow the biosolids to be spread evenly over the approximately 236 ha (584 acres) of appropriate parcels of the assessed land, avoiding areas having soils of Class 5 or Class 6. Based on the target application rate outlined above, the lands proposed to receive biosolid material from the primary and secondary cells should be suitable as long as soil test phosphorus is below 120 ppm.

Bullets 4 & 5: With regard to the 3rd order drain (Graham Creek) and the 7th order drain (Souris River) when determining the area available for biosolid application, the setback distances (buffers) around the drains were accounted for when initially determining the land that would be part of the Land Suitability Assessment and buffer areas were not used as part of the 616 acre calculation. During application, the areas along Graham Creek and the Souris River that are vegetated will have a 3 metre nutrient buffer zone and those areas that are not vegetated will have an 8 metre nutrient buffer zone. The nutrient buffer zone will be measured from the water body's high water mark or the top of the outermost bank of that side of the water body, whichever is further from the water.

Bullet 6: The potential wetland area on section NW 26-03-27W was recognized during the assessment. As stated in Section 4.3.2 of the EAP (page 19), in order to minimise risk to the environment and human health, minimum setback distances (buffer zones) have been established in the Nutrient Management Regulation (NMR). Per the NMR the EAP recognizes that there are limits for the application of any type of fertilizer within three metres of rivers, streams, creeks, wetlands and storm water retention ponds; within 15 metres from lakes, reservoirs, springs and wells; within 15 metres of vulnerable rivers; and within 30 metres of vulnerable lakes. The EAP takes these buffer zones into consideration and addresses the potential effects of the project on groundwater in Section 6.3 (page 24), stating that appropriate buffer zones will be established around the area having Class 5W (i.e. the wetland in section NW 26-03-27W) and around residences and groundwater features (wells, surface drainage, etc.).

In Appendix B, Map 1 shows the fields proposed for land application of biosolids and Map 2 shows the agricultural capability of the lands. Table 2 of Appendix B states that soils having agricultural capability class $ER, EBL and GHM will be avoided when spreading biosolids.

Bullet 7: The total area of the setbacks from drains due to the nutrient buffer zones mentioned above are excluded from the land base calculations used to determine the area of land necessary for biosolids application. In Section 2.0 (page 2) of the EAP, it is stated that a Land Suitability Assessment was performed on the applicable 249 ha (616 acres) portions of the seven quarter sections being considered. These were selected to provide sufficient land area as a contingency for unexpected biosolids quantity, quality, and solids content, as well as to provide adequate area for future land application, if required. In section 5.4 (page 21) it is stated that the biosolids would be spread over 584 acres. Of the fields assessed, it was determined that some areas had soils of Class 5 and Class 6 and that those areas, totaling 32 acres, would need to be avoided during the biosolid application. The total land area assessed was 616 acres,

however the proposal states that certain areas will be avoided and biosolid application will only be done on 584 acres.

As stated above, areas having Class 5 and Class 6 soils will be avoided during biosolid application and appropriate buffers will be observed (bullet 8). The areas to be avoided will be communicated to the spreading operator prior to the start of biosolid application.

Additional questions received on October 20, 2016 are addressed below.

Bullet 1: Certificates of Title and land ownership agreements have been requested from the Town of Melita and will be provided upon receipt.

Bullet 2: Please refer to attached email (attached) from Kenton Thiessen (KGS Group) to Travis Parsons (Manitoba Water Services Board) regarding the availability of lands having clay or clay till in the project area. Concerns relating to the lack of clay or clay till in the area were communicated to Bruce Webb (Sustainable Development) and it is understood that discussions indicated that the proposal should be submitted using the lands proposed.

The biosolids will be injected to previously cropped land but excavating test-holes to verify the depth of clay till is not an option in 2016. Biosolids injection will avoid low lying areas where the water table depth may become questionable next spring.

Bullet 3: It appears that there is a slight rounding error with the acreage values presented in Figure 1. As stated above, the total land area assessed for biosolid application is 616 acres, however it was determined that some soils on the subject fields were not suitable for biosolid application and so will be excluded during application. The total land area that will be subject to biosolid application is 584 acres.

Yours truly,

Gene Senior, M.A.
Environmental Scientist

GS/jr
Attachment

cc: Bill Holden, Mayor of Melita
Travis Parsons, Manitoba Water Services Board

Gene Senior

From: Kenton Thiessen <KThiessen@kgsgroup.com>
Sent: July-19-16 4:29 PM
To: 'Shaun Moffatt'; 'Gene Senior'
Subject: FW: Melita Maps

Categories: Red Category

-----Original Message-----
From: Parsons, Travis (MMG) [mailto:Travis.Parsons2@gov.mb.ca]
Sent: July-19-16 1:32 PM
To: 'Kenton Thiessen'; 'Holden, Bill'
Cc: 'Rob Sinclair'; 'Alfred Beghin'; Schmidt, Jaimee (MMG)
Subject: RE: Melita Maps

I had a discussion with Bruce Webb today about biosolids land application requirements in Melita. When I mentioned about the flood plain restriction he was very surprised and again when I mentioned the 1.5 m of clay. His suggestion was to submit the EAP with the current proposed land.

Travis Parsons, M.A.Sc., P.Eng.
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email: travis.parsons2@gov.mb.ca

-----Original Message-----
From: Parsons, Travis (MMG)
Sent: July-18-16 4:38 PM
To: 'Kenton Thiessen'; 'Holden, Bill'
Cc: 'Rob Sinclair'; 'Alfred Beghin'
Subject: RE: Melita Maps

Kenton
I had a discussion with Rob Boswick on July 13th. Sounded like getting approval in time to land apply in 2016 is not realistic. Up north where there is no agriculture, I understand they can still landfill. In a situation where there is no available land within a reasonable distance, I wonder if we would be allowed to landfill?

Travis Parsons, M.A.Sc., P.Eng.
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-----Original Message-----
From: Kenton Thiessen [mailto:KThiessen@kgsgroup.com]
Sent: July-18-16 3:14 PM
To: Parsons, Travis (MMG); 'Holden, Bill'
Cc: 'Rob Sinclair'; 'Alfred Beghin'
Subject: FW: Melita Maps

Hi Travis and Bill,

We've done a bit of research into possible land areas for the sludge application. As discussed before, there is a requirement for 1.5 m of clay between the ground surface and the water table. Attached are the surficial geology maps for the area and soil suitability maps for a 5 mile radius around Melita. The geology map shows that the only surficial clay is along the flood plains, which we can't apply sludge to. I've highlighted a few sections (marked with a black outline on the "Potential land areas" file) that show the best potential for land application. The GW Drill logs for these sections show some promise, but would require test pitting to confirm that there is clay or till >5 feet thick.

Robert Boswick also indicated that he would require >3 months minimum to get a license in place after submission. Bruce Webb had indicated to you that this process would be much quicker, however, apparently it is Robert and not Bruce that does this review. I would recommend that you discuss with Robert. He's got us in a pretty tough spot, as we're not allowed to landfill the sludge, and soils within a reasonable distance of the lagoon may not be suitable.

I've also discussed some options with Assiniboine Injections. The maximum distance they can pump is 6 - 7 km, so we would likely require land within this distance of the lagoon. Hauling is an option, but becomes pretty expensive if we have to go far. They estimated $1/m3/km. They also have to haul at a low solids content to prevent settling. Overall, hauling does not seem practical. They have done dewatering using geotubes, but would need a significant amount of lined area to keep these tubes at the lagoon site. Other mechanical dewatering methods go for about $10,000/day to hire a separate company to do it, and would take about a month.

In order to keep this going I would recommend:
- Travis you may want to give Robert Boswick a call to discuss the situation we're in and get an indication on what options are available to us.
- Bill, if you could confirm that at least some of the areas I've identified (marked in black on the attached drawing) may be possible to land apply and that the farmers would be ok with sludge application
- Once these land areas are confirmed, KGS could mobilize quickly to do some testpitting to see if there is 1.5 m of clay and/or till

Thanks,
Kenton

-----Original Message-----
From: Jordan Karpinchick [mailto:jordankarpinchick@toneag.com]
Sent: July-15-16 11:37 AM
To: Kenton Thiessen
Subject: Melita Maps

Hi Kenton,

I have attached 3 maps of the enlarged study area (5 mile radius of lagoons):

Overview Map

Soil Textures Map

Ag Capability Map (showing Inundated soils in grey - need to avoid those)

It seems like most of the clays in the area are either river beds or bush/pasture due to slope etc. The best looking clays according to soils map are located in Section 8, 16 and 17-3-26W. There is a hog barn location in NW 17-3-26W so I imagine these soils have been spread on quite frequently over the years.

It seems like loams are are best/only real option going forward. If we can stay out of the sandier soils, we may have a good argument. Maybe some of the drill logs for loam fields west of hwy 3 will show some more clay than was previously mapped in 1978 (including Section 26-3-27W which is currently in our project area).

Regards,

Jordan

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