

SUMMARY OF COMMENTS/RECOMMENDATIONS

PROPONENT: Rural Municipality of Hanover –U.V.D. of Kleefeld
PROPOSAL NAME: Wastewater Stabilization Pond Expansion
CLASS OF DEVELOPMENT: 2
TYPE OF DEVELOPMENT: Wastewater Treatment Lagoon
CLIENT FILE NO.: 1727.20

OVERVIEW:

On May 30, 2008, the Department received an Environment Act Proposal (EAP) from the Rural Municipality of Hanover for the expansion of the existing U.V.D. of Kleefeld wastewater treatment lagoon that is located in NW 19-6-5EPM in the Rural Municipality of Hanover. The proposed expansion consists of the construction of a new secondary cell that will be located immediately adjacent to the south perimeter dyke of the existing wastewater treatment lagoon. The intercell dyke currently dividing the existing primary and secondary cells will be removed, combining these cells to form one larger primary cell. Treated wastewater from the wastewater treatment lagoon will be discharged between June 15th and November 1st of any year via an existing municipal drain which flows north into Tourond Creek which flows west and then north into the Red River.

The Department, on June 6, 2008, placed copies of the EAP report in the Public Registries located at 123 Main St. (Union Station), the Millennium Public Library, the Jake Epp Public Library, and the Manitoba Eco-Network and provided copies of the EAP report to the Canadian Environmental Assessment Agency (CEAA) and Technical Advisory Committee (TAC) members. As well, the Department placed public notifications of the EAP in the Steinbach Carillon on Thursday, June 12, 2008. The newspaper and TAC notifications invited responses until July 10, 2008.

On August 7, 2008 Manitoba Conservation forwarded requests for additional information from the TAC to the proponent. Copies of the TAC correspondences and that request letter were sent to the Public Registries that same day. The proponent's September 18, 2008 response to the requests was then provided to the participating TAC for review and comment on October 7, 2008.

On November 19, 2008 Manitoba Conservation forwarded supplementary requests for additional information from the TAC to the proponent. Copies of the TAC correspondence and that request letter were sent to the Public Registries on November 25, 2008. The proponent's December 19, 2008 response to the requests was then provided to the participating TAC for review and comment on January 6, 2009.

On March 5, 2009 Manitoba Conservation forwarded supplementary requests for additional information from the TAC to the proponent. The proponent's March 23, 2009 response to the requests as then provided to the participating TAC for review and comment on March 27, 2009.

On April 2, 2009 Manitoba Water Stewardship presented comments regarding the proponent's response. There were no other comments from the TAC.

COMMENTS FROM THE PUBLIC:

There were no comments from the public.

COMMENTS FROM THE TECHNICAL ADVISORY COMMITTEE:

Agriculture Food and Rural Initiatives

- *No concerns.*

Environmental Operations Branch – Conservation (Summarized)

August 7, 2008

- *There is little or no discussion regarding details and impacts on the lagoon of truck hauled septage or holding tank wastewater from residents of the U.V.D. or rural residential lots in the R.M. of Hanover included in the assessment. The impact(s) of the limited time period of each year during which delivery of septage is permissible has not been discussed;*
- *There is no information regarding how the operation of the low pressure sewer system in the U.V.D. impacts the operation of the wastewater treatment lagoon;*
- *There are no details regarding the proposed process of removing the existing dividing dyke;*
- *There is no mention of a soil liner, previous erosion, or any required repairs for the dykes of the existing cells; and*
- *There is no information regarding potential impacts by or on groundwater relative to the lagoon's past operation or the expanded lagoon's future operation.*

Proponent Responses – September 18, 2008:

- Based upon information provided by the R.M., wastewater from all residents of the U.V.D. of Kleefeld has been accounted for as reported in the EAP. No accommodation has been provided for accepting wastewater into the lagoon from

other rural residential lots in the R.M. Therefore, no impact on the lagoon is expected of trucked septage or holding tank from communities and population other than those identified in the EAP.

- Impact on the operation of the lagoon due to operation of the low pressure sewer system has been addressed by way of accounting for approximately 15% infiltration into the system. In addition, the R.M. has a weeping tile by-law in place that prevents discharge of weeping tile flows into the lagoon. Therefore, no significant impact on the lagoon of the operation of the low pressure system is expected given that the R.M. has the by-law in place and that 15% potential infiltration has been incorporated. All the effluent from the low pressure sewer system is pumped to the lagoon and septage cleaned from septic tanks on the system is hauled to the lagoon and has been accounted for as discussed above.
- The existing dike will be removed using an excavator and hauled from its present location.
- Review of the as constructed drawings of the existing Kleefeld lagoon indicates that the lagoon is constructed of clay lined bottom and interior slopes of the dikes. Based upon site review in October 2007, erosion of the lagoon structure was not observed to the extent of jeopardizing the lagoon integrity. Therefore, there is no proposed repair on the existing lagoon dikes.
- There were not reported groundwater concerns with the current lagoon. There were no monitoring wells to determine if there was any legitimate concern. However, a monitoring plan could be included to monitor the impact of the expanded lagoon on the surrounding groundwater.

October 28, 2008

- *As many of the surrounding lagoons do not accept septage and truck haul, what measures will be in place to prevent or restrict truck haul from outside the Village of Kleefeld and ensure rural residential properties are not a factor in the loading rates of the proposed expansion of the lagoon? Also what is proposed to provide truck dump service to the rural homeowners?*
- *Please provide explanation of a discrepancy for the growth rate of 10% stated in s.1.5.2 of the R.M. of Hanover Development Plan and the 3% growth rate for the R.M. of Hanover indicated in the proposed lagoon expansion?*
- *Whilst using an excavator and hauling the existing dividing dike as indicated in the initial response, please elaborate on the proposed process to re-establish the clay liner in order to avoid compromising the integrity of the cell?*
- *A recent site inspection in October 2008, confirmed a previous sites inspection conducted in 2007 by Manitoba Conservation that the following exists at the site: visible slumping, erosion, mechanical damage and rutting to the existing berms, and an abandoned forcemain visible in the current secondary cell that potentially has heaved the clay liner. How will this current state of the lagoon be addressed*

during the lagoon expansion? Also how will the pending upgrade to the truck dump be incorporated to the expansion of the lagoon?

- *What are the static or high ground water levels and what is proposed if ground water is found during construction?*
- *It is stated in the National Testing Laboratories Limited letter of December 6, 2007 to JR Cousin Consultants Ltd, “Laboratory testing is recommended to confirm the hydraulic conductivity of marginal liner materials” was this completed?*
- *Is there sufficient clay material to line the new cells and repair the old cells without a borrow pit?*

Proponent Responses – December 19, 2008:

- The following is provided in response to the above directly as received from the R.M. of Hanover.

"We have provided Provincial Planning and Manitoba Conservation with the following outlook for development over the next 20 years:

■ **Projected Lagoon Capacity**

<u>Households</u>	<u>Urban</u>	<u>RR</u>	<u>Other</u>
Mitchell	1200	1100	
Kleefeld	400	0	
Grunthal	1000	300	
New Bothwell	300	200	
Blumenort	1200	0	
Agricultural Area			800
Total	4100	1500	800

- **Growth - Hanover is projecting growth from 1800 households in the urban areas to 4100, from 1000 households in the RR area to 1500 and agricultural households to remain the same over the next 20 years**

Kleefeld should be able to accept Kleefeld urban and rural septage for the first number of years, until other facilities at Mitchell and New Bothwell are completed and come on line. Hanover already has a locked gate at the Kleefeld lagoon. Hanover intends to take further security measures at our various lagoon sites to identify users of those facilities and apply a user fee for septage dumping. We can review the logs of registered septage haulers to ensure that there are not abuses to our facilities."

- The response to the above is provided below as received from the R.M. of Hanover:

"Hanover's Population numbers are as follows:

1991 - 8905

1996 - 9833 10.4% more than 1991 (over a 5 year period)

2001 - 10785 9.7% more than 1996 (over a 5 year period)

2006 - 11781 9.2% more than 2001 (over a 5 year period)

This works out to a 2% per year average based on the last four census'. We are trying to project a 3 - 4% growth rate in our urban centres (we used 4% for Blumenort) as we believe the availability of Rural Residential lots will be declining. I am attaching Section 1.5.2 of our proposed Development Plan, that indicates our growth comments - we do not state that we are growing by 10% per year."

- As indicated in our September 18, 2008 correspondence the existing intercell dike can be removed using an excavator and the excavated material hauled from its present location. There is no intention of excavating into the liner of the existing lagoon. The intercell dike would be removed to approximately 150 mm of the bottom portion of the intercell dike, hence the termination of the excavation would be approximately 150 mm above the liner.
- The forcemain observed in the secondary cell is not an abandoned forcemain. It is a forcemain that was installed in the secondary cell at a time lagoon expansion was contemplated in the past (1994). The intention was to convert the existing secondary cell into primary cell but that did not materialize. It can be utilized during the lagoon expansion to redirect the wastewater into the secondary cell when conducting repair works in the primary cell and while upgrading the truck dump and spillway, before the intercell dike is removed. The forcemains installed in the existing primary and secondary cells are connected and fitted with valves in such a manner that either of them can be used. The current state of the lagoon would be inspected at the time of the lagoon expansion and necessary repairs would be performed.
- Short term groundwater condition in the test holes (seven) was assessed during the geotechnical investigation of the site conducted on November 7, 2007. Details of the geotechnical investigation can be found in the "U.V.D. of Kleefeld (in the R. M. of Hanover) Geotechnical Investigation for Wastewater Treatment Lagoon Expansion" report prepared by J.R. Cousin Consultants in January 2008. Seven test holes were excavated and no water was observed in any of the test holes. According to well logs included in the geotechnical report, the average static groundwater level of wells in the vicinity of the lagoon area is in the range 0.6 — 24 in (average 9.5 m) below ground surface. Based on the above the static groundwater in the lagoon area could impact water level in the test holes. However, at the time this investigation was conducted this impact was not evident in any of the test holes. Hence it is unlikely that the groundwater will impact the construction. Any surface water entering through rain will be dealt with by typical construction practices as detailed in the JRCC specification document, i.e. in brief, slope construction area and pump into ditches if need be.
- The marginal material was not tested as suggested by the National Testing Laboratories. Testing would be completed if the soils were to be used for construction

of the lagoon liner. At this stage JRCC's opinion is that marginal soils will be removed and replaced with compacted high plastic clay soils, should the marginal soils be encountered in the liner. In this case the vertical cutoff walls would be extended to at least 1 metre depth into the in-situ high plastic clay soil from the lagoon cell floor. Alternatively, if significant quantities of marginal soils are encountered, the vertical cutoff walls could be extended to at least 1 metre depth into the in-situ high plastic clay soils from the bottom of the marginal soils. This may require additional excavation of suitable clay soils from a borrow pit for the cutoff walls.

- Based on test hole information obtained from the 2007 geotechnical investigation, it is expected that there is sufficient suitable clay soil at the site to construct the 1 metre clay liner providing a hydraulic conductivity of 1×10^{-7} cm/sec or less as required by Manitoba Conservation. Should the clay soils at the site be insufficient clay from borrow site may be obtained from potential sites per the R.M.'s indication as follows:

"Hanover has some land on the south side of the Tourond Creek just over a mile directly north of this site. We also have a new shop site that might have appropriate clay - but that is 3.5 miles away from this site. If necessary these sites could be examined for creating a borrow pits."

March 5, 2009

- *There will have to be vigilant inspection of the facility before, during and after the construction by the consultant engineer to ensure environmental protection due to the variability and quality of the material, the undetermined volume and the source of the material and the unknown design and soil parameters identified;*
- *It is noted that the proposed actions are to potentially utilize the forcemain that is currently above the lagoon surface levels in the existing secondary cell; if this is to occur it is suggested that a thorough inspection of the integrity of the pipe, the joints, and the penetration of the berm be completed prior to putting the pipe into operation, as it is believed that it is not in the original location or original angle that it was installed;*
- *The response with respect to the removal of the berm does not provide sufficient clarity, as it indicates that the berm was originally created on top of the clay liner. This would need to be confirmed on site by the engineering supervising the project; and*
- *Additional locations have been identified for a source of clay for the liner, however testing has not been completed to determine if the clay is suitable.*

Proponent Responses – March 23, 2009:

- Inspection and supervision will be provided by the engineer prior to, during and upon completion of the lagoon expansion, as necessary, to ensure environmental protection.

- Integrity of the forcemain piping including the joints and the penetration of the berm will be inspected before utilizing the Forcemain to direct the wastewater to the secondary cell.
- The client would be willing to have the engineer verify, at the time of the berm removal, whether or not the berm was originally built on top of the clay layer.
- As stated in our December 19, 2008 letter response, it is expected that there is sufficient suitable clay soil at the proposed lagoon expansion site to expand the lagoon with a 1 metre thick clay liner as required by Manitoba Conservation. Should clay borrow from the additional locations be required the soils from the additional locations would be tested to determine their suitability prior to utilizing the soils for the soil liner construction.

Disposition:

- Limits, terms and conditions of Environment Act Licences respecting wastewater treatment lagoons present operating criteria regarding hydraulic and organic loads, odours, containment and quality of treated wastewater that are conventional for lagoons in Manitoba.
- The draft Environment Act Licence contains a Clause requiring that the Licencee submit to the Director for approval, within two months of the date of this Licence, a groundwater investigation and monitoring plan for the site of the Development to monitor for liner integrity.

Environmental Services Branch – Conservation

- *No concerns.*

Historic Resources Branch – Conservation

- *No concerns.*

Parks and Natural Areas Branch – Conservation

- *No concerns.*

Sustainable Resource & Policy Management Branch – Conservation

- *No concerns.*

Wildlife & Ecosystem Protection Branch – Conservation

June 23, 2008

- *The proposal states that since the expansion will occur on agricultural land immediately adjacent to the existing lagoon, impacts to wildlife and wildlife habitat will be negligible. The proposal states that a search of the Conservation*

- Data Centre (CDC) data base showed that several provincially rare or uncommon species may occur in the general area of the development. With this in mind, care should be taken by the proponent to restrict all development activities to the proposed project area and thus ensure that any natural habitat or native vegetation communities are not disturbed by the project.*
- The proponent should be aware that since many areas of the province have not been thoroughly surveyed, the absence of data in the CDC database in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present. The information provided by the CDC should therefore not be regarded as a final statement on the occurrence of any species of concern nor can it substitute for on-site surveys for species that will be impacted by the development. It is the responsibility of the proponent to inspect the project area prior to and during construction to determine if any rare or endangered species may be impacted. The proponent needs to be aware that if rare or endangered species are present, removal or destruction of individuals or their habitat may be in contravention of Subsection 10(1) “Prohibition” of The Endangered Species Act (Manitoba). In addition, the federal Species at Risk Act prohibits any activities that kill or otherwise harm COSEWIC-listed plant or animal species and prohibits destruction of habitat for these species. If species of concern are present, the proponent must contact the Biodiversity Conservation Section of the Wildlife and Ecosystem Protection Branch to discuss possible mitigation options well in advance of any disturbance.*
 - The proponent should also be aware that killing or harming migratory birds and disturbance, destruction or taking of their nests or eggs is prohibited under the Migratory Birds Convention Act. The proponent is responsible for ensuring that no migratory birds will be harmed and no active nests of migratory birds will be destroyed as a result of the development. If migratory birds or their nests may be harmed by this development, the proponent must contact the Canadian Wildlife Service for further direction.*

Proponent Responses – September 18, 2008:

- Care will be taken by the proponent to restrict all development activities to the proposed lagoon expansion area so that natural habitat and vegetation in the surrounding would not be disturbed.
- The project area will be inspected prior to and during the lagoon expansion construction works to determine presence of rare or endangered species in the project area. The proponent is aware that, if present at the site, removal or destruction of any rare or endangered species or their habitat without any mitigative measure is inappropriate. Therefore, the Biodiversity Conservation Section of the Wildlife and Ecosystem Protection Branch will be contacted if any species of concern is encountered at the site during the lagoon expansion works. Possible mitigative measures will be discussed with the Branch and the mitigative measures will be

implemented based upon the discussion.

- The proponent is aware that banning of migratory birds in any way is also inappropriate without planned mitigative measures in place such as carefully relocating their nests and eggs. Therefore, care will be taken to avoid any harm to migratory birds and destruction of their active nests due to the lagoon expansion construction. This can be addressed in the specification for construction of the lagoon. It could be indicated to the contractor to notify the proponent of any migratory birds, their nests, or eggs encounter so that the proponent can discuss with the Canadian Wildlife Service of potential mitigative measures before proceeding with the construction works.

Disposition:

- Limits, terms and conditions of Environment Act Licences respecting wastewater treatment lagoons require the Licencee to construct and operate the wastewater treatment lagoon in such a manner as to prevent the disruption of natural wildlife and fish habitats.

Infrastructure and Transportation

- *No concerns.*

Intergovernmental Affairs

- *The existing lagoon is located in the northwest corner of NW ¼ 19-6-5 EPM, approximately one and one half mile west of the UVD of Kleefeld and immediately west of the RM of Hanover and RM of De Salaberry municipal boundary. The lagoon expansion is proposed to be constructed directly south of the existing lagoon on approximately 8.1 hectares of land. The land within the study area is designated “Rural Area” according to the RM of Hanover Development Plan. Land uses within this designation are primarily agricultural in nature with a mixture of other land uses, such as residential.*
- *The land is zoned “R” Rural Zone according to the RM of Hanover Zoning By-law. Lagoons or open pits for the storage an/or treatment of domestic sewage is a conditional use according to the Zoning By-law and have a minimum site size requirement of 20 acres and a minimum site width requirement of 400 feet. The title proposed for the lagoon expansion encompasses approximately 20 acres (8.1 hectares) of land with a site width of approximately 920 feet.*
- *Existing surrounding land uses are primarily agricultural in nature. It appears that the closest residential dwelling to the proposed site is located approximately 1,200 metres (3,937 feet) south-east on the south-westerly portion of SE ¼ 19-6-5 EPM. Land use of the proposed site is currently agricultural in nature (cultivated).*

- *The proposed lagoon is generally in keeping with the intent of the RM of Hanover Development Plan and Zoning By-law. A conditional use will have to be obtained from the municipality prior to the establishment of the facility on site.*
- *Our office has no concerns with respect to the proposal.*

Water Stewardship

July 10, 2008

- *The Water Rights Act indicates that no person shall control water or construct, establish or maintain any “water control works” unless he or she holds a valid licence to do so. “Water control works” are defined as any dyke, dam, surface or subsurface drain, drainage, improved natural waterway, canal, tunnel, bridge, culvert borehole or contrivance for carrying or conducting water, that temporarily or permanently alters or may alter the flow or level of water, including but not limited to water in a water body, by any means, including drainage, OR changes or may change the location or direction of flow of water, including but not limited to water in a water body, by any means, including drainage. If the proposal in question advocates any of these activities, application for a Water Rights Licence to Construct Water Control Works is required.*
- *The Lake Winnipeg Stewardship Board has recommended that all small wastewater treatment facilities, including municipal lagoons, should meet a phosphorus limit of 1.0 mg/L. The proposed phosphorus limit of 1.0 mg/L is consistent with efforts underway across Manitoba and in upstream jurisdictions to reduce nutrient loads to Lake Winnipeg and its watershed. It is desirable to recycle these nutrients on land, rather than releasing them to waterways. In the Lake Winnipeg Stewardship Board’s December 2006 report to the Minister of Water Stewardship, the Board provides several strategies on how nutrient reduction could be achieved for small wastewater treatment facilities (see recommendations 14-20). It appears that the proponent has not considered any alternative wastewater disposal strategies which would reduce nutrients reaching downstream waterways. It would be desirable for the proponent to evaluate the feasibility of using one or more of these alternative treatment. In particular, effluent irrigation and trickle discharge should be explored as alternative disposal strategies which could replace or at least supplement the traditional disposal practices.*
- *From proposal drawing titled “proposed lagoon expansion layout” Appendix E, the proposed discharge pipe and valve are located approximately 90 metres from the road ditch (2nd order drain). Providing the retention time in the proposed secondary cell is not compromised, the Department recommends an Environment Act Licence to include the following requirement:*

- *Increase the distance of the proposed discharge pipe and valve by moving the discharge pipe 160 metres east from the road ditch (2nd order drain). Thus potentially increasing phosphorous uptake within the perimeter ditch before reaching the road ditch.*
- *The proposed expansion is designed to accommodate fifteen (15) years of service. The Department recommends that communities plan for at least twenty (20) years (for both loading and hydraulic capability) when expanding lagoons so that these facilities can more easily institute nutrient reduction strategies when required in the future (e.g. effluent irrigation, trickle discharge, etc.). For example, the additional capacity would allow the flexibility of irrigating when conditions were favourable (i.e. late spring, early summer).*
- *The Department is concerned with any discharges that have the potential to impact the aquatic environment and/or restrict present and future uses of the water. Therefore, the Department recommends to include the following in an Environment Act Licence:*
 - *The Licencee shall actively participate in any future watershed based management study, plan/or nutrient reduction program, for all downstream waterways, approved by the Director, Water Science and Management Branch, Manitoba Water Stewardship.*
- *Although back-hoe pits dug by the proponent’s consultant consistently indicate about 14 feet or more of clay below ground surface, water well logs on file with the province indicate that the clay is underlain by glacial tills which contain sand and gravel lenses which locally are/or may be used as aquifers. While the rate of seepage from the current and proposed expansion to the lagoon system is expected to be quite slow due to the low hydraulic conductivity of the underlying clays, the size of the lagoons is very large so volumetric seepage rates may be quite significant, even with clays extending to 14 feet, should these clays be immediately underlain by permeable materials.*
- *The information that has been provided in support of the proposal does not discuss the potential for impacts to underlying sand/gravel aquifers – it simply states that the overburden is quite thick in this area and that a 1 metre clay liner is all that is required. The Department recommends that the proponent should perform either of the following:*
 - *Conduct an additional assessment of the potential for shallow aquifers to occur in this area; a calculation of potential seepage rates to these aquifers; and, an evaluation of possible impacts and approaches that may need to be considered; or,*
 - *Conduct additional test drilling to depths of about 9 metres to further evaluate the thickness of clay or till at the proposed expansion site.*

Proponent Responses – September 18, 2008:

- The proponent understands the requirement for Water Rights Act in relation to water control works. It does not appear that this proposal advocates any of the activities as you have them listed but when the project proceeds to the design stage, the need for Water Rights License application for this project will be re-verified and if so required a License shall be solicited.
- The Lake Winnipeg Stewardship Board – Report to the Minister of Water Stewardship, December 2006, was reviewed with particular emphasis to the effluent irrigation and trickle discharge options. The effluent irrigation option is not advisable for a small lagoon such as that proposed for the Kleefeld lagoon in the R.M. of Hanover. The initial required high capital cost, high operation cost, lack of trained man power, and insufficient amount of effluent to reliably meet crop water requirement from the lagoon make the option not feasible.

Calculations indicate that, in year 15, the expanded lagoon can be completely discharge over two to three weeks period with the discharge pipe valve fully open resulting in an average discharge flow rate of approximately 0.06 m³/sec. Given the limited permissible period of discharge (between June 15 and November 1) and the expected annual volume (approximately 81,332 m³) of treated effluent to be discharged in year 15, a trickle discharge would not enable complete discharge of the lagoon within the permissible period of discharge. However, the lagoon could be completely discharged at a reduced rate of approximately 0.01 m³/sec over 16 to 18 weeks period in year 15, rather than at 0.06 m³/sec discharge rate over two to three weeks period. This reduced rate of discharge is approximately 17% of the “fully open” discharge rate.

Furthermore, the Kleefeld lagoon would be receiving strictly residential wastewater with organic contribution from the population at the rate of 0.076 kg BOD₅/person/day. JRCC can advise the R.M. of Hanover to encourage their community to use non-phosphate based soap products for their domestic purposes. This would enable to reduce the quantity of phosphorus being released into the lagoon via the wastewater from residences. The R.M. would be willing to create such awareness and educate their citizens. In addition, the phosphorus level in the treated effluent could be tested prior to discharge and alum could be spread in the lagoon to reduce the level of phosphorus in the treated effluent to 1.0 mg/L, if required.

- As per the original drawing in the EAP the discharge pipe and valve is located approximately 120 m east of the road (Road 24 E) ditch. To increase the opportunity for phosphorus uptake within the perimeter ditch the discharge pipe and valve will be located approximately 245 m east of the road (Road 24 E) ditch.
- The proponent realizes that expansion of the lagoon for 20 years service is preferable to 15 years. However, additional land other than the 8.1 ha of R.M. owned land has not been procured yet hence the R.M. wishes to go forward with the planning for 15 years.

- The proponent would be willing to participate in any future watershed based management study, plan/or nutrient reduction program, approved by the Director, for Tourond Creek, the Red River and associated waterways; and
- Assessment of shallow aquifers to occur in the project area and calculation of seepage rates to such aquifers was beyond the scope of the project. As discussed in Section 2.6.9 of the EAP, the current Design Objectives for Standard Sewage Lagoons in Manitoba state that the interior surfaces of a lagoon be underlain by at least one metre of soil having a hydraulic conductivity of 1×10^{-7} cm/sec or less. Excavation of test holes at the site indicated that the soils at the site are predominantly clay soils having hydraulic conductivity of less than 1×10^{-7} cm/sec to a depth of at least 4.2 from the surface. Therefore, it is expected that there is sufficient suitable clay soil to construct the 1 metre clay liner providing a hydraulic conductivity of 1×10^{-7} cm/sec or less as required by Manitoba Conservation. Hence test drilling beyond the 4.2 m depth was not deemed necessary.

October 16, 2008

- *The Department supports the proponent's reference to a drainage period, lasting 16 to 18 weeks, between June 15th and November 1st. The Department encourages this to be incorporated into an Environment Act Licence.*
- *The Department recommends that an Environment Act Licence require the proponent to periodically cut and remove vegetation growing in the 1.5-kilometre discharge path (drainage ditch). This drainage ditch runs from the lagoon release pipe to Toround Creek. Vegetation in the ditch will further remove nutrients from the wastewater and periodic cutting and removal ensures the nutrients are completely removed from the water.*
- *Regarding the consultant's response to a request for additional work to evaluate the possible presence of sand/gravel under part of the site, the consultant's reply is simply that they need to meet the minimum standard set by Manitoba Conservation for construction of a lagoon and any additional investigation is "beyond the scope" of the project. The Department reiterates the need for additional investigation.*
 - *The Department strongly recommends that the proponent is required to perform either of the following:*
 - *Conduct an additional assessment of the potential for shallow aquifers to occur in this area; a calculation of potential seepage rates to these aquifers; and, an evaluation of possible impacts and approaches that may need to be considered; or,*
 - *Conduct additional test drilling to depths of about 9 metres to further evaluate the thickness of clay or till at the proposed expansion site.*

Proponent Responses – December 19, 2008:

- *Assessment for potential shallow aquifers*

A review of Drillers' Reports (GWDrill Logs, 2007) compiled by Manitoba Water Stewardship indicates that there are six production wells located within Section 19-6-5 E, the Section in which the existing Kleefeld lagoon is located. According to the Drillers' Reports four of the six production wells identified in Section 19-6-5 E draw water from relatively deep open holes in limestone at varying depths ranging from 34 m to 56 in below the ground surface. Two of the six production wells draw water from shallower perforations in sand and gravel situated between 6 m and 18 m depth below the surface. From the above review it appears that as shallow as 6 m aquifers are present in the area surrounding the lagoon site.

- *Soil profiles of the 'bur deep wells*

The soil profile of one of the four deep wells consists of surficial coarse gravel with stone material in the depth range of 0 to 7 in from surface overlying fine sand to a depth of approximately 17 m followed by gray sandy clay and brown clay layers extending to depth of approximately 43 in from the surface. The soil profile exhibited in the above well log is unusual in the lagoon site area as the well is the only one with surficial coarse gravel material. The well is located approximately 1200 in south east of the expanded lagoon. The soil profile in the second of the four deep wells consists of approximately 4.3 in thick clay layer underlain by alternating layers of gravel, till, and sand to a depth of approximately 33 m from the surface. The soil in the third deep well is composed of 3.6 in till underlain immediately by clay layer to a depth of approximately 8 m, followed by predominantly till type soils to a depth of approximate 39 in from the surface. The fourth deep well has a surficial soil profile composed of 18 m till underlain immediately by sand layer to a depth of approximately 20 m, followed by predominantly till type of soils to a depth of approximate 38 m from the surface.

- *Soil profiles of the two shallow wells*

The soil profile of one of the two shallow wells consists of an average of approximately 9 m thick clay layer underlain by fine sand with clay to a depth of approximately 16 m from the surface. The soil in the second shallow well is composed of 6 m clay layer underlain immediately by sand and gravel to a depth of approximately 9 m from the surface.

- *Findings of most recent geotechnical investigation*

Based on geotechnical investigation conducted in November 2007, the soil at the proposed lagoon expansion site consists of high plastic clay soils to a depth of approximately 4.2 in below ground surface. Since excavation was terminated at 4.2 m the types of soils that exist below the 4.2 m depth are not known. However, from the

soils information to the depth of 4.2 m, it is expected that there is sufficient suitable clay soil at the site to construct the 1 metre clay liner providing a hydraulic conductivity of 1×10^{-7} cm/sec or less as required by Manitoba Conservation. From the above review of the Drillers' Reports it appears that sand and gravel layers are likely to be present possibly immediately below the clay layers encountered at the lagoon expansion site. Hence no additional drilling is suggested only prove the presence of the sand and gravel below the clay layer.

- *Hydraulic conductivity testing*

Laboratory testing of a Shelby tube soil sample from the lagoon expansion site subjected to a hydraulic conductivity test revealed that the hydraulic conductivity of the soil was 6.9×10^{-9} cm/sec. Based upon the above, it is unlikely that seepage from the lagoon constructed with clay soils at the site would impact the groundwater as the overburden clay soils are expected to have a of at least 1×10^{-7} cm/sec or less.

- *Calculation of potential seepage rate*

The potential seepage rate through the soils at the lagoon expansion site was conducted using Darcy's one directional flow equation. The lagoon maximum operating liquid depth of 1.5 m was used as the hydraulic head value in the seepage calculation, although the lagoon is not expected to be operating at full capacity at all times. In addition, the regulatory hydraulic conductivity value of 1×10^{-7} cm/sec was utilized instead of the 6.9×10^{-9} cm/sec value obtained from the laboratory test result of the soils at the lagoon expansion site. The calculation indicated that seepage through the clay soils at the site is expected to be in the order of 0.216 mm/day or less, which is minimal. Use of the hydraulic conductivity of 6.9×10^{-9} cm/sec would result in 14 times less seepage rate than the above.

- *Evaluation of possible impacts*

Based upon the above, it is unlikely that seepage from the lagoon constructed with clay soils at the site would impact the groundwater as the overburden clay soils are expected to have a hydraulic conductivity of at least 1×10^{-7} cm/sec or less.

January 28, 2009

- *The proponent's consultant has reviewed well logs and provided a seepage assessment.*
- *The Department recommends that an Environment Act Licence include the following requirements:*
 - Perform a hydrogeological assessment of the local conditions through conducting additional test drilling in order to develop the background information needed to install a proper and scientifically valid groundwater monitoring program or, alternately, to establish that such a groundwater monitoring program is not needed.

- Furthermore, conducting additional test drilling will develop a more complete understanding of the potential for impacts on shallow sand/gravel in the area.

Disposition:

- Limits, terms and conditions of Environment Act Licences respecting wastewater treatment lagoons present operating criteria regarding hydraulic and organic loads, odours, containment and quality of treated wastewater that are conventional for lagoons in Manitoba.
- Limits, terms and conditions of Environment Act Licences respecting wastewater treatment lagoons require the Licencee to construct and operate the wastewater treatment lagoon in such a manner as to prevent the disruption of natural wildlife and fish habitats.
- The draft Environment Act Licence contains a Clause requiring that the Licencee submit to the Director for approval, within two months of the date of this Licence, a groundwater investigation and monitoring plan for the site of the Development to monitor for liner integrity.
- The draft Environment Act Licence contains a clause that requires that the Licencee actively participate in any future watershed based management study, plan/or nutrient reduction program, approved by the Director, for Tourond Creek, the Red River and associated waterways.

COMMENTS FROM FEDERAL REPRESENTATION:

Canadian Environmental Assessment Agency

- *Based on the responses to the CEAA survey, application of The Canadian Environmental Assessment Act with respect to this proposal will not be required. Health Canada indicated that advice may be provided upon request. Fisheries and Oceans Canada provided advice for consideration.*

PUBLIC HEARING:

A public hearing was not requested.

RECOMMENDATION:

Issue an Environment Act Licence in accordance with the attached draft. The Licence should be assigned to the Environmental Assessment and Licensing Branch until all testing has been completed and the facility is fully commissioned in accordance with the Licence.

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