SUMMARY OF COMMENTS/RECOMMENDATIONS

PROPONENT:	**Parks Canada – Riding Mountain National Park**
PROPOSAL NAME:	**Sewage Lagoon Sludge Disposal Project**
CLASS OF DEVELOPMENT:	**2**
TYPE OF DEVELOPMENT:	**Waste/Scrap**
CLIENT FILE NO.:	**5473.00**

OVERVIEW:

On June 17, 2010, the Department received an Environment Act Proposal (EAP) from Parks Canada for land application of sludge that has been removed from the Wasagaming wastewater treatment lagoon located in NE 24-19-19WPM and is currently stockpiled at the Grey Owl Landfill located in NE 4-20-18 WPM, both being within Riding Mountain National Park. The sludge will be removed from the landfill, transported to farmlands, surface applied, and incorporated to the sub-surface soils through cultivation. Registered land owners of the parcels of lands involved had been contacted and are willing to have the sludge applied to their agricultural land. The parcels of land on which the sludge may be applied are located within: SW 10-19-19WPM; NE, NW, and SE 15-19-19WPM; NE and NW(E half) 21-19-19WPM; and NE(S half), NW, and SW 22-19-19WPM in the Rural Municipality of Park.

The Department, on July 6, 2010, placed copies of the EAP report in the Public Registries located at 123 Main St. (Union Station), the Millennium Public Library, the Rural Municipality of Park, 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 Brandon Sun on Saturday, July 10, 2010, the Minnedosa Tribune on Friday, July 9, 2010 and the Erickson South Mountain Press on Saturday, July 10, 2010. The newspaper and TAC notifications invited responses until August 11, 2010.

On September 30, 2010 Manitoba Conservation forwarded requests for additional information from the TAC to the proponent. Copies of the TAC and federal correspondence and request letters were sent to the Public Registries. The proponent's October 27, 2010 response to the requests was then provided to the participating TAC for review and comment on October 29, 2010.

On November 22, 2010 Manitoba Conservation forwarded requests for additional information from the TAC to the proponent. Copies of the TAC correspondence and request letters were sent to the Public Registries. The proponent's March 29, 2011 response to the requests was then provided to the participating TAC for review and comment on April 19, 2011.

Returned comments from the participating TAC indicate that the information provided by the proponent's consultant adequately addressed Manitoba Water Stewardship's earlier concerns.

The draft Licence was circulated to the TAC and the proponent for comments. Comments received resulted in revisions to the draft Licence. Such comments are included herein as appropriate.

COMMENTS FROM THE PUBLIC:

There were no comments from the public.

COMMENTS FROM THE TECHNICAL ADVISORY COMMITTEE:

Note that appended materials that were supplied with the consultant's responses have not been included in the summary due to the large volume that would result.

Aboriginal Relations Branch – Conservation

July 19, 2010

- *The Government of Manitoba has a duty to consult in a meaningful way with First Nations, Métis communities and other aboriginal communities when any proposed provincial law, regulation, decision or action may infringe upon or adversely affect the exercise of a treaty or aboriginal right of the First Nation, Métis community or other aboriginal community.*
- *As Manitoba Conservation is aware, if a thorough, adequate consultation process is not completed by the Government of Manitoba, the possibility of a successful legal challenge from First Nation and Aboriginal communities is significantly increased. The claim could be based on an unjustified infringement(s) of a Treaty or Aboriginal right.*
- *We assume that we do not know all of the aboriginal rights that are beyond the assertions already made and therefore information gathering and consultation results in these issues being brought forward by the people who practice them and use the land. Issues are accommodated and building relationships in a process like this includes assessments on the following; Traditional Ecological Knowledge (TEK), capacity building and education, adequate information sharing and access, environmental impacts, heritage, cultural and significant sites, socio-economic impacts and public involvement in the process from the start.*
- *This project lies within a Community Interest Zone (CIZ) for Treaty Land Entitlement (TLE) of the Rolling Rivers and Keeseekoowenin First Nations. It*

would be appropriate to consult these communities to ensure any concerns they have regarding this project are addressed. This consultation would be able to establish the exact boundaries of the CIZs for both communities.

- *Though the lagoon upgrade and proposed site for the sludge application should not be a concern, without knowing the boundaries of the CIZs this can not be said with any finalization.*
- *A consultation with the Rolling Rivers First Nation and Keeeseekoowenin First Nation is recommended to ensure TLE claims in this area or other concerns with this project are acknowledged.*

Proponent Responses – October 21, 2010:

- The proponent has received a letter from Mr. Missyabit indicating that there is uncertainty about the potential for an infringement on Treaty and Aboriginal rights. A suggestion was made that a "consultation" might be appropriate under the circumstances. We note the following:
  - The sludge is intended to be applied on private land (i.e., does not include a disposition of Crown land, to which CIZs apply).
  - The private landowners are fully accepting of the proposed application.
  - The land is outside of the federal park boundary.
  - The duty to consult rests with the Province of Manitoba, because the action triggering the duty is the decision that it will allow the land application.
  - We remain unaware of any provincial determination regarding the duty to consult, or any intention to undertake the consultation.
- Accordingly, at this time, we are not in the position to undertake any such consultation, even if this were delegated to us by the Province. Further, we are unaware of any decision by the Province to undertake such consultation, and the matter accordingly rests with the Province of Manitoba.
- In addition, the lagoon upgrade activities referenced in the comment from Aboriginal Relations Branch are extraneous to the scope of this EAP.

Disposition:

- The draft Environment Act Licence contains clauses which;
  - cause the Licencee to apply the sludge solids to areas within the designated area which are not subject to flooding;
  - require that the sludge solids remain the furrow opening; and
  - require that the surface expression of the sludge solids is acceptable to an Environment Officer.

- Minimum setbacks from any occupied residence, residential area, waterways and groundwater wells are designated in the draft Environment Act Licence.
- The draft Environment Act Licence contains Clauses that require the Licencee to remove, transport, and incorporate the sludge solids into the soils in such a manner as to prevent the disruption of natural wildlife and fish habitats.

Pollution Prevention Branch – Conservation

- *Odour nuisance may be a concern if there are residential or cottage/camping areas (receptors) near the sludge application areas especially under unfavourable meteorlogical conditions. Odours are typically strongest during spreading and decrease rapidly within days after spreading. Re-wetting of the sludge can also cause high odours to occur after periods when the odours have been minimal. It is expected that the potential for odour nuisance will be managed and addressed during the project's implementation and this can be included in the EA License clauses.*

  Odour nuisance may also occur during the hauling and transport of sludge from the stockpile to the application areas.

Disposition:

- The draft Environment Act Licence contains a clause that requires that the Licencee not construct, alter or operate the Development, or permit the Development to be constructed, altered or operated, in a way that causes or results in an odour nuisance, and requires that the Licencee take steps as the Director may require to eliminate or to mitigate an odour nuisance.

Environmental Services Branch – Conservation

September 9, 2010

- *Soil samples were taken in May 2010 post-seeding and fertilization and are not suitable for determining accurate soil nutrient concentrations, sludge application rates, or environmental risk(s). The proponent should be required to resample all land for sludge application post-harvest and pre-sludge application to determine more accurate soil nutrient concentrations for establishing sludge application rates, in accordance with the Nutrient Management Regulation to better assess environmental risk(s).*
- *The regulated soil nitrate-nitrogen limits should be observed for all Nutrient Management Zones (NMZ), including NMZ 2, as proscribed by the Nutrient Management Regulation.*
- *Sludge application should be prohibited on lands designated as NMZ 4, as proscribed by the Nutrient Management Regulation.*

- *It is unclear if sludge application rates were calculated on a wet or dry basis and may have serious environmental risk if miscalculated. The proponent should be required to clarify sludge application calculations for further review prior to any sludge application.*
- *The sludge application rate for the South Stockpile appears to have been miscalculated. As a result, the land base required for sludge application has also been miscalculated. The proponent should be required to recalculate the application rate and determine additional land base required for the South Stockpile. In addition, the proponent should be required to soil sample appropriate land for required additional landbase prior to sludge application.*
- *Calculated sludge application rates do not meet the target 100 kg ha^{-1} plant available nitrogen. The proponent should be required to notify all cooperating landowners of the applied nitrogen and phosphorus rates to reduce environmental risk and soil nutrient loading.*
- *The paper referenced (Qian and Schoenau, 2002) used to determine the mineralization rate of organic nitrogen to calculate the plant available nitrogen for sludge application rates focused primarily on livestock manure. Therefore, it may be more appropriate to use research studies published in refereed journals on biosolids to determine mineralization rates of organic nitrogen to determine biosolid application rates.*
- *Application of livestock manure to any land receiving sludge must be done in accordance with the Livestock Manure and Mortalities Management Regulation (M.R. 42/98) and soil residual nitrate- nitrogen limits and phosphorus loading thresholds as prescribed in Section 12, and the proponent shall identify any such lands for the 2010 crop year to prevent environmental risk and soil nutrient loading.*
- *A soil nutrient monitoring program should be considered for the estimated three year benefit period for all lands which receive sludge to ensure unacceptable nutrient loading or other environmental impact has not occurred as a result of sludge application. Soil samples should be taken in the fall post harvest and the bench mark soil sampling strategy should be used to monitor soil nutrient concentrations and an annual report should be provided to the Parks Canada Agency and all land owners involved.*

<u>Proponent Responses – October 27, 2010</u>:

- As recommended (Pg. 7.4; S. 7.3.2; para. 3), the Proponent has committed to completing postharvest, pre-sludge application soil sampling to determine prescriptive application rates for each field.

  The field-specific prescriptive application rates will help ensure that the residual concentrations of nitrate-nitrogen and phosphorus do not exceed those outlined in the *Nutrient Management Regulation (NMR)* of the *Water Protection Act*. Prescriptive application rates will be determined for each field, as deemed practical for application, and will be based on the most limiting NMZ (> 10% of area) within the application area.

The sludge application area refers to NMZs 1, 2 and 3. Sludge application will not occur on portions of fields which include NMZ 4 in accordance with s. 9(1) of the *Nutrient Management Regulation (NMR)* of the *Water Protection Act*. See Section 2.1.3 below for further details.

The following approach will ensure that the effects of sludge application activities do not exceed the applicable regulatory threshold and therefore are not anticipated to pose any significant environmental risk.

- As indicated in Section 2.1.1 above, the residual concentration of nitrate-nitrogen will be based on the most limiting NMZ present in the application area of each land parcel.
- As indicated in Section 2.1.1, sludge application will not occur on portions of fields which include NMZ 4 in accordance with s. 9(1) of the *NMR* of the *Water Protection Act.* NMZ 4 lands will be demarcated by environmental staff for avoidance prior to the land application of sludge, to ensure that sludge is not applied in NMZ 4.
- Laboratory analyses of sludge solids were reported on a wet basis. Analytical data was converted to a dry basis for the calculation of sludge application rates. The gross sludge application rates and resultant nutrient application rates were presented in the report on a dry basis.

  Hypothetical sludge application rates of 85 tonnes ha^{-1} and 50 tonnes ha^{-1} for the north sludge and south sludge stockpiles, respectively, and as reported in the original EAP have been recalculated to remedy initial errors and address TAC comments, and are presented in Appendix B.
- The sludge nutrient concentrations found in Table 9, and the nutrient application rates associated with the gross sludge application rates in Table 12, have been recalculated to remedy initial errors and address TAC comments. The revised calculations are presented in Appendix B.

  Based on the revised calculations, the 494 ha landbase identified within the local study area in the EAP provides sufficient receiving land for the sludge stockpiles based on initial estimates. Therefore, additional receiving land is not required.

  Fall soil sampling will be conducted prior to sludge application and sample results will be used to determine field-specific prescriptive sludge application rates to ensure soil nutrient residual concentrations are within the criteria outlined in the *Nutrient Management Regulation*.
- The proponent confirms that the calculated sludge application rates do not meet the target 100 kg ha^{-1} plant available nitrogen outlined in Section 7.3.1. Prescriptive application rates will be field-specific, and will be based on practical and feasible sludge application rates to optimize nutrient applications within the criteria outlined in the *Nutrient Management Regulation*. The target 100 kg ha^{-1} will not necessarily be achieved.

Cooperating landowners will be notified of applied nitrogen (including estimates of plant available nitrogen in years 1, 2 and 3) and phosphorus rates, to incorporate into their agronomic management program, to reduce environmental risk and soil nutrient loading.

- Cerrato et al. (1991) note that most studies of the rate of N mineralization in sludge-treated soils have been conducted at an optimum temperature (usually 35^{o}C) for microbial activity; however, this temperature is never observed in Manitoba soils under any conditions. Further, they note that in southern Manitoba, surface (i.e. 0-10 cm) soil temperatures average 17^{o}C in the summer months (May-August), one-half of the temperature commonly used in most studies of the rate of N mineralization. Therefore, there is limited information applicable to N mineralization following sewage sludge application to Manitoba soils under variable temperature and moisture conditions.

  Cerrato et al. (1991) found that N mineralization rates ranged from 8.6 to 10.1 % in moist soil and 2.4 to 10.1 % in wet soil following 16 weeks of incubation at 15^{o}C. After 40 weeks of incubation at 15^{o}C, N mineralization ranged from 16.9 to 27.7 % in moist soil and 7.7 to 19.4 % in wet soil. Based on these results, the N mineralization rates of 10-10-5 % for years 1-2-3 used to estimate the contribution of organic N to plant available N following sewage sludge application appear to be reasonable.

  Further to this, the researchers note that the largest amount of organic N is mineralized in the first year following sludge application, and therefore the largest beneficial effects of sewage sludge application to agricultural land also occurs during this period.

  In relation to N mineralization under livestock manure amended soils, Akinremi (2010 Pers.Comm) suggests that sewage sludge amended soils should not be expected to have higher N mineralization rates.

- Cooperating producers will be notified of the requirements outlined above, as required. The proponent will identify any such lands for the 2010 crop year, as part of the prescriptive application rates and summary reporting to Manitoba Conservation (as outlined in Section 8.0 of the EAP).

- In response to the comment, the Proponent has committed to the conductance of a three-year benchmark soil nutrient monitoring program for the estimated three year benefit period for all receiving sludge lands. Soil sampling will be conducted in the fall of each year, with locations corresponding to the benchmark site established for pre-application soil sampling. The program will ensure that unacceptable nutrient loading or other environmental impact has not occurred as a result of sludge application. An annual report of the soil monitoring program will be provided to the Parks Canada Agency and all land owners involved.

November 9, 2010

- *The sludge nutrient analysis from the laboratory reported on a 'dry-basis'. Therefore, in order to determine accurate sludge application rates, soil nutrient loading concentrations, and/or environmental risk(s), the sludge stockpile nutrient results listed in Table 9, should be re-calculated to reflect the laboratory analysis method.*
- *Taking into consideration the laboratory sludge analytical results, further detail on the lagoon dredging process and the resulting state of the sludge stock piles is required.*

Proponent Responses – March 25, 2011:

- (Section 2.2.1) - The sludge application rates, soil nutrient loading concentrations, and sludge nutrient results were re-calculated on a 'dry-basis' in accordance with the laboratory analysis. The affected tables from the EAP have been updated and are included in Appendix C.

  Please see the responses in Sections 2.1.1 and 2.2.2 regarding revised sludge application rates and resulting nutrient application estimates based on sludge and soil test results from 2010.

- (Section 2.2.2) - Sludge material was excavated and removed from the lagoon cells by a third party contractor using backhoes and bulldozers. Backhoe excavation of sludge material was conducted to a depth until natural soil was visually encountered. Excavated sludge material was placed on the lagoon walls to dry for several weeks prior to being loaded into trucks for hauling off-site. In late summer / fall of 2009, sludge material was hauled to the Grey Owl Landfill and stockpiled on bare soil at two sites within landfill determined to be low risk for subsurface and surface water impacts by EGE Engineering Ltd. (2009). As of December 2009, the approximately 19,000 m^3 or 60% of the sludge was stockpiled in the North Pile area, with the remaining approximately 12,000 m3 or 40% stockpiled in the South Pile area.

  It is acknowledged that the sludge analytical results indicated lower than anticipated nutrient concentrations. This is likely due to a high mineral sand soil content in the sludge material, as evidenced by the high sand content in the laboratory particle size analysis and visual inspection of the sludge stockpiles The elevated mineral material levels may have been encountered due to inclusion of some lagoon floor material with the sludge during the excavation / relocation process. Based on the relative bulk densities of sludge and sandy soil materials, the inclusion of underlying mineral sand soil material to sludge on sludge removal could result in a dilution effect to the resultant sludge stockpile nutrient concentrations. An additive effect may be from mineral material being deposited into the lagoon from the collection system. Other potential sources of error that could have resulted in the unexpected and low nutrient concentrations (particularly nitrogen) in the sludge may be laboratory or sampling error.

To provide confirmation of the original sludge analytical results and exercise due diligence, the Proponent has committed to re-sampling the sludge material as well as the soil landbase (i.e., agricultural fields) and calculating prescriptive application rates for the actual application season prior to land application. These prescriptive application rates, including full calculations, full analytical results and sampling procedures will be submitted to Manitoba Conservation for review and approval prior to land application.

Disposition:

- The draft Environment Act Licence contains clauses which;
  - cause the Licencee to apply the sludge solids to areas within the designated area which are not subject to flooding;
  - require that the sludge solids remain the furrow opening; and
  - require that the surface expression of the sludge solids is acceptable to an Environment Officer.
- Minimum setbacks from any occupied residence, residential area, waterways and groundwater wells are designated in the draft Environment Act Licence.
- The draft Environment Act Licence contains Clauses that require the Licencee to remove, transport, and incorporate the sludge solids into the soils in such a manner as to prevent the disruption of natural wildlife and fish habitats.
- The draft Environment Act Licence contains a Clause that requires the Licencee, during all sludge land activities, to comply with the requirements of *Manitoba Regulation 62/2008* respecting *Nutrient Management Regulation* or any future amendment thereof.

Parks and Natural Areas Branch – Conservation

- *No concerns.*

Sustainable Resource & Policy Management Branch – Conservation

- *No concerns.*

Health

- *The mitigation measures outlined under Section 6.3.1 address the potential effects to public health and safety related to exposure to biological pathogens, nuisance odour and/or metal accumulation in crops.*
- *The proposal identifies the residential areas of Wasagaming, Onanole, and the First Nation communities of Keeseekoowenin and Rolling River (pages 5.4-5.5). 6 rural residents (page 5.4) , and 5 groundwater wells in the local study area (page 5.3). The table in 6.3.1.3 establishes buffer zones for the rural residences, the*

groundwater wells and for the residential areas of Wasagaming and Onanole. Will similar buffer zones be established for the First Nation communities of Keeseekoowenin and Rolling River?

Proponent Responses – October 21, 2010:

- All First Nation communities (i.e. reserves parcel boundaries) would be included in the 1,000 m buffer requested by Parks Canada for residential areas. The local study area (i.e., specific land application fields) is currently in excess of 1,000 m from First Nation reserve land parcels.

Disposition:

- The draft Environment Act Licence includes clauses that require the sludge to be transported, applied and incorporated in such a manner as to minimize risk to the environment and public health.

Infrastructure and Transportation

- *No concerns.*

Science, Technology, Energy and Mines

- *Some of the agricultural lands that are part of this proposal are underlain by extensive glaciofluvial deposits that consist of sand and gravel. These deposits may be windows to the local aquifers (water table) and therefore groundwater contamination should be considered as part of this assessment.*

Proponent Responses – October 21, 2010:

- The risk of groundwater contamination has been assessed in relation to the potential leaching and migration of nutrients from the sludge. The risk of groundwater contamination with nitrogen was found to be low due to the following processes occurring along the contaminant pathway from the source to groundwater:
  - The slow release of nitrogen from the sludge in contrast to conventional fertilizers.
  - Crop uptake of nitrogen during the growing season with little chance of leaching through the soil profile.
  - Rapid dentrification in the soil profile. Similar sludge application rates and techniques show that the envelope of nitrogen concentrations decreased below 10 mg/L in groundwater at 2 m depth below sludge-fertilized fields (Gottschall et al., 2009).
  - Presence of extensive shallow clay-barriers in soil profile in each driller's log (Province of Manitoba, 2009) from the area of proposed sludge application minimizing vertical water movement (Table 1).

- In addition to these processes, the risk for contamination of potable groundwater sources is minimized due to the following actions:
  - Application rates of sewage sludge based on field-specific prescriptive application rates to be determined based on pre-sludge application soil nutrient residual sampling results, sludge nutrient concentrations (plant available nitrogen and phosphorus), consideration of nutrient management zones (NMZs) and according to soil nutrient residuals outlined in the *Nutrient Management Regulation*.
  - Landowner notification of nutrient applied from sewage sludge for incorporation into producer agronomic management programs.
  - Incorporation of applied sludge at a depth of 15 cm
  - Maintenance of a 50 m buffer from groundwater wells

  Taking in to account all these factors, it can be concluded that the risk of groundwater contamination is minimal. If nitrogen impact to groundwater occurs, it will be shallow, localized and temporary, and is unlikely to pose any risk to human health.

Disposition:

- The draft Environment Act Licence contains clauses that do not permit sludge to be applied to land:
  - with a depth of clay or clay till of less than 1.5 metres between the soil surface and the water table;
  - within 100 metres of an identifiable boundary of an aquifer which is exposed to the ground surface.

Water Stewardship

August 11, 2010

- *Manitoba Water Stewardship recommends an Environment Act Licence to include the following requirements:*
  - *The Licencee shall conduct soil sampling of the land area intended for spreading in the fall of 2010 (post harvest and pre-application of biosolids).*
    - *This information shall be submitted to Manitoba Water Stewardship's Nutrient Management Program, for further review. From a nutrient standpoint, the soil sampling conducted in the spring of 2010 are not suitable for determining the appropriateness of biosolids application.*

- *In addition, a quality control/quality assurance program should be conducted by the soil test laboratory used.*
  Alternatively, instead of a formal accreditation process, a proficiency testing process which evaluates inter-laboratory comparisons such as the North American Proficiency Testing Program would also be considered.

- *The Licence shall comply with the Nutrient Management Regulation (Manitoba Regulation No. 62/2008) under The Water Protection Act:*
  - *Note that there are no water bodies directly adjacent to land identified in this proposal that are listed as vulnerable under the Nutrient Management Regulation and there are no drains classified greater than a 2nd order drain.*
  - *Biosolids cannot be applied to land between November 10th of one year and April 10th of the following year effective January 1, 2011, for Nutrient Management Zones N1, N2 and N3.*
  - *Soil survey information included in the Proposal indicates some of the fields have Zone N4 soils as defined under the Nutrient Management Regulation. These areas of Zone N4 shall not be included in the area of land required to incorporate the nutrients contained in the sludge.*
  - *Nutrients cannot be applied within the Nutrient Buffer Zone as outlined in the Nutrient Management Regulation (Table 1).*
  - *Larger setbacks are recommended if site specific conditions such as steep slopes exist. Guidance on setbacks that consider slope greater than 4 % and type of application (Table 2).*
  - *Fields containing N3 soils shall receive a lower application rate of sludge than the N1/N2 fields.*
    - *The land considered for this application contains approximately equal proportions of N1, N2 and N3 soils, the Proposal only mentions the nutrient limits for zone N1 and N3 soils. N2 soils must also be included. The residual N limit for N3 soils is comparatively very low and meeting them with organic N from sludge (which can have highly variable mineralization rates from year to year) will be challenging.*
  - *The Licencee shall conduct soil sampling of the Nutrient Management Zones within a field (i.e. separate soil samples for N1, N2, and N3 soils within each field).*
    - *Results from annual fall soil tests for residual NO_3-N (0-60 cm) and Olsen-P (0-15 cm) need to be reported for 3 crop years following sludge application to insure soil test levels comply with the Nutrient Management Regulation.*
  - *The Licencee shall conduct a total phosphorus analysis (wet digestion/acid soluble) of the sludge to evaluate whether N based or P based applications are most appropriate and the sludge application rate can not be evaluated without this information.*
  - *The Licencee shall be required to calculate maximum total P (not Olsen-P) application rates based on the 100 kg/ha nitrogen application rate.*

- *Effective January 1, 2011, a Nutrient Management Plan must be registered with Manitoba Water Stewardship if:*
  - *Nutrients will be applied to any field that exceeds the residual soil nitrate-nitrogen limits listed in the Nutrient Management Regulation for Nutrient Management Zones N1, N2 and N3.*
  - *Nutrients will be applied to any field resulting in soil test phosphorus measuring 60 ppm or more within Nutrient Management Zones N1, N2 and N3 and the phosphorus application rates listed in the Nutrient Management Regulation cannot be met.*
- *In order to protect riparian areas, establish and maintain an undisturbed native vegetation area located upslope from the ordinary high water mark and adjacent to all waterbodies and waterways connected to the provincial surface water network:*
  - *A 15-metre undisturbed native vegetation area is recommended for lands located adjacent to first and/or second order drains;*
  - *A 30-metre undisturbed native vegetation area is recommended for lands located adjacent to third and/or higher order drains and/or waterbodies;*
  - *The combined alteration—including new and existing structures—within this undisturbed native vegetation area is limited to a maximum of 25 % of the shoreline length (for example: 25 metres per 100 metres of shoreline length) of each lot for a boat house, path, dock, etc.; and,*
  - *Alteration within this undisturbed native vegetation area—including a dock and/or the removal of near shore or stream aquatic habitat—shall not occur unless an activity conforms to a Department of Fisheries and Oceans Canada Operational Statement or an activity is reviewed by the Department of Fisheries and Oceans Canada.*
- *The Licencee shall comply with Manitoba Water Stewardship's Wetland Policy:*
  - *The net loss of semi-permanent or permanent wetlands shall not occur. Wetlands are defined as areas that are periodically or permanently inundated by surface or ground water long enough to develop special characteristics including persistent water, low-oxygen soils, and vegetation adapted to wetland conditions. These include but are not limited to swamps, sleughs, potholes, marshes, bogs and fens.*
    - *The Licencee shall implement a buffer zone adjacent to wetlands with at least a 3-metre width.*

- *Manitoba Water Stewardship requests clarification for the following:*
  - *There are errors in units or calculations in Tables 9 and 12 that need to be addressed before final comments can be provided – based on re-calculations using the 85 and 50 dry tonnes/ha application rate and the 10% plant availability of organic N, the proponent proposes to apply 129 and 144 kg/ha plant available N not 70 and 79 as listed in Table 12. To reach the targeted application rates the land base needs to be about 900 ha. An additional 15%*

contingency should be included in the plan resulting in a total required land base of 1035 ha.

- *The values for plant available N in year 2 and 3 of Table 9 also are not adequate for the 10%-10%-5% availability of organic N described in the text and the footnote to the table. This needs to be corrected.*
- *Section 4.1 refers to surface application and incorporation of the sludge into the "sub-surface." Sub-surface soil generally refers to the soil layer below the plow layer of a cultivated soil.*
  - *The Proposal should state that sludge will be incorporated into the 0-15 cm depth.*
- *Section E.1 states that "the purpose was to assess the total land required when achieving a 100 kg ha^{-1} of nitrogen application rate and subsequent application of phosphorus."*
  - *The Proposal does not mention a subsequent application of phosphorus.*

- *Manitoba Water Stewardship submits the following comments:*
  - *Manitoba Water Stewardship does not object to this proposal, at this time.*
  - *The Manitoba Department of Water Stewardship is mandated to ensure the sustainable development of Manitoba's water resources. Manitoba Water Stewardship is committed to the goals of: protecting aquatic ecosystem health; ensuring drinking water is safe and clean for human health; managing water-related risks for human security; and stewarding the societal and economic values of our waterways, lakes and wetlands; for the best water for all life and lasting prosperity. Manitoba Water Stewardship achieves these goals, in part, through administering legislation, including The Water Protection Act, The Water Rights Act, and The Water Power Act.*
  - *The Water Rights Act requires a person to obtain a valid licence to control water or construct, establish or maintain any "water control works." "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 a proposal advocates any of the aforementioned activities, a person is required to submit an application for a Water Rights Licence to Construct Water Control Works. A person may contact the following Water Resource Officer to obtain an application and/or obtain information.*
    - *A contact person is Mr. Ed MacKay, C.E.T., Senior Water Resource Officer, Water Control Works and Drainage Licensing, Manitoba Water Stewardship, 1129 Queens Avenue, Brandon, Manitoba R7A 1L9, telephone: (204) 726-6226, email: ed.mackay@gov.mb.ca.*

- *The proponent needs to be informed that if the proposal in question advocates any construction activities, erosion and sediment control measures should be implemented until all of the sites have stabilized.*
- *The Manitoba Department of Water Stewardship's recent policy direction recommending Public Reserves to protect water is founded, in part, on the 135 recommendations in the Lake Winnipeg Stewardship Board's (December 2006) report titled, "Reducing Nutrient Loading to Lake Winnipeg and its Watershed, Our Collective Responsibility and Commitment to Action." All 135 recommendations were accepted in principle by the Minister of the Manitoba Department of Water Stewardship, on behalf of the Government of Manitoba.*
- *Maintaining an undisturbed native vegetation area immediately adjacent to the shoreline of lakes, rivers, creeks, and streams helps stabilize banks, provides aquatic and wildlife habitat and protects water quality through filtering overland runoff. The width of an undisturbed native vegetation area should be the widest width possible and practical. In conjunction with other best management practices such as eliminating fertilizer use adjacent to surface waters, and the proper management and disposal of waste water, maintaining an undisturbed native vegetation adjacent to waterbodies is important to help prevent degradation of water quality.*
- *This watershed is located in the Assiniboine River Basin (Manitoba Basin and Watershed Boundaries map). Proper nutrient management that avoids excess loss of nutrients to surface waters are needed on all lands receiving nutrients in southern Manitoba because long-term trend analysis of total phosphorus and total nitrogen has shown significant increases in these nutrients in the Assiniboine and Red rivers (Jones and Armstrong 2002).*

Table 1. Section 3(3) of the Nutrient Management Regulation under *the Water Protection Act* states that "the Nutrient Buffer Zone" consists of the following:

Water Body	Setback if Nutrient Buffer Zone IS covered with permanent vegetation	Setback if Nutrient Buffer Zone IS NOT covered with permanent vegetation
• A roadside ditch or an Order 1 or 2 drain†	No direct application to ditches and Order 1 and 2 drains	
• A groundwater feature††	15 m* (49 feet)	20 m (66 feet)
• A wetland, bog, marsh or swamp other than a major wetland, bog, marsh or swamp‡	Distance between the water's edge and the high water mark	
• a lake or reservoir designated as vulnerable**	30 m (98 feet)	35 m (115 feet)
• a lake or reservoir (not including a constructed stormwater retention pond) not designated as vulnerable** • a river, creek or stream designated as vulnerable**	15 m (49 feet)	20 m (66 feet)
• a river, creek or stream not designated as vulnerable** • an Order 3 or higher drain† • a major wetland, bog, marsh or swamp‡ • a constructed stormwater retention pond	3 m (10 feet)	8 m (26 feet)

* The Nutrient Buffer Zone is measured out from the water body's high water mark or the top of the outermost bank on that side of the water body, whichever is further from the water. No person shall apply a substance containing nitrogen or phosphorus to land within the Nutrient Buffer Zone.

† Designated on a Manitoba Water Stewardship plan that shows the designation of drains.

†† Groundwater feature means a sinkhole, a spring or a well other than a monitoring well.

‡ As defined in section 1(2) in the Nutrient Management Regulation under the *Water Protection Act.*
"For the purposes of this regulation, a wetland, bog, marsh or swamp is major if
(a) it has an area greater than 2 ha (4.94 acres)
(b) it is connected to one or more downstream water bodies or groundwater features;

and

(c) it contains standing water or saturated soils for periods of time sufficient to support the development of hydrophytic vegetation."

** Designated as vulnerable if listed in the Schedule in the Nutrient Management Regulation under *The Water Protection Act.*

Drain order maps may be accessed via Agri-Maps at the following link: http://geoapp2.gov.mb.ca/website/mafri/index3.html
Individuals wishing a copy of a drain order map, may contact Manitoba Water Stewardship at: (204) 726-6306 (Western Manitoba) or (204) 467-4452 (Eastern Manitoba).

Table 2. Guidelines for Setback Distance From Watercourses, Sinkholes, Springs, Wells (Metres)[1] where slope is greater than 4 %

Slope	Application Method		
	Surface Applied and Irrigation[2]		
	No incorporation	Incorporation within 48 hours	Injection
4 - 6%	60	40	10
6 - 12%	90	60	15

1 Distances based on soil not supporting perennial forage crops or with minimal trash cover.

2 Where a perennial forage crop or good trash cover is present, distances may be reduced by 1/2.

Proponent Responses – October 21, 2010:
The following are responses to comments received from W.Weaver of Manitoba Water Stewardship. The full comments are included in Appendix A.2.
Recommendations for inclusions in the Environment Act Licence were provided by Manitoba Water Stewardship. The proponent respectfully provides the following comments:

- *"The Licencee shall conduct soil sampling of the Nutrient Management Zones within a field (i.e. separate soil samples for N1, N2, and N3 soils within each field)"*
  - The proponent requests the above requirement be considered in relation to practical management considerations (i.e. practical sludge application areas), and recommends that this licence requirement be revised to the following:

  - *"The Licencee shall conduct soil sampling of the Nutrient Management Zones within a field (i.e. separate soil samples for the largest N1, N2, and N3 soil map unit within each field) occupying greater than 10% of the area to receive sludge application."*
- The revised calculations for Tables 9 and 12 indicate that originally proposed landbase of 494 ha is sufficient to receive the stockpiled sludge. Based on the hypothetical gross application rates of 85 and 50 dry tonnes/ha for the north and south sludge stockpiles, respectively, the plant available nitrogen application rates would be 22 and 13 kg/ha, respectively. The 494 ha landbase provides sufficient land considering a 15 % contingency. Revised tables are presented in Appendix B.
- The calculations for plant available nitrogen have been corrected to accurately reflect table footnotes and sample calculations in the report text. The revised table calculations are found in Appendix B.
- Pg. 6.1; Section 6.2.1 and 6.2.2; para. 2 address subsurface incorporation. The report states: *"The sludge is being applied and incorporated to a depth of 15 cm minimizing any opportunity for overland flow to groundwater wells or drainage pathways."* The preceding reference to sub-surface incorporation (Section 4.1) should be interpreted the same, sludge applied to the surface of receiving lands will be incorporated to a depth of 15 cm.
- The "subsequent application of phosphorus" referred to in section 7.3 (p. 7.3) was presented in Table 12 based on the proposed hypothetical gross sludge application rates of 85 and 50 tonnes/ha for the north sludge and south sludge stockpiles, respectively. These calculations have been re-calculated and revised to include estimated phosphorus applications as P2O5 equivalent, and are presented in Appendix B.

<u>November 15, 2010</u>

Manitoba Water Stewardship has reviewed a response, dated on October 27, 2010, from the proponent's consultant, forwarded for review and comment on October 29, 2010.

- *The response from the proponent's consultant does not include a total phosphorus analysis, as requested. The Department cannot complete an evaluation of this proposal without the following requested information:*
  - *The Licencee shall conduct a total phosphorus analysis (wet digestion/acid soluble) of the sludge to evaluate whether N based or P based applications are most appropriate and the sludge application rate can not be evaluated without this information.*
  - *The Licencee shall be required to calculate maximum total P (not Olsen-P) application rates based on the 100 kg/ha nitrogen application rate.*
- *The proponent's consultant must provide the requested information, before an Environment Act Licence is issued.*

<u>Proponent Responses – March 29, 2011</u>:

The following are responses to comments received from W. Weaver of Manitoba Water Stewardship. The full comments are included in Appendix A.

The proponent respectfully provides the following comments:

- (Section 2.1.1) - Additional sludge samples were taken from the North and South Stockpiles on October 25, 2010 for analysis of total phosphorus by wet, acid digestion (reference method: EPA 3050B) by an accredited laboratory. Total phosphorus concentrations for the North Stockpile were found to be 440 mg/kg and 340 mg/kg for the south ½ and north ½ sample points, respectively (Appendix B). Total phosphorus concentrations for the South Stockpile were found to be 480 mg/kg and 520 mg/kg for the south ½ and north ½ sample points, respectively, and 360 mg/kg for the south ½ duplicate (south sludge 1B) (Appendix B).

  Field-based, prescriptive application rate determinations were made to evaluate whether Nbased or P-based applications are most appropriate and evaluate corresponding sludge application rates. Prescriptive application rates were determined based on sludge analytical results and soil analytical results for receiving lands from sampling activities in 2010, and were evaluated separately for the North and South Stockpiles. Cropping scenarios evaluated included wheat and canola, with N and P2O5 recommendations taken from the soil test analyses. Based on the soil test results from Spring 2010, all BiCarb P concentrations in the 0-15 cm depth increment were below the 60 ppm level (the highest BiCarb P was found to be 16 ppm) for all identified receiving lands, indicating that P was not a limiting factor from the receiving land perspective. However, based on the application rate evaluation, P-based application rates were found to be most appropriate for all identified receiving lands to avoid over-application of P to the receiving lands due to the relative concentrations of N and P in the sludge. According the soil residual BiCarb P results mentioned previously, an appropriate guideline for P-based application rates would be two times crop removal rate.

  For the North Stockpile, P-based sludge application rates based on a two times crop removal rate ranged from 57 to 97 tonnes/hectare and averaged 82 tonnes/hectare (Table 13a, Appendix C). For the South Stockpile, P-based sludge application rates based on a two times crop removal rate ranged from 49 to 84 tonnes/hectare and averaged 70 tonnes/hectare (Table 13a, Appendix C). For comparison purposes, the gross application rates reported in the original EAP and used for total receiving landbase planning were 85 tonnes/hectare and 50 tonnes/ hectare for the North and South Stockpiles, respectively. The P-based application rates would generally result in a net negative balance of available nitrogen (Tables 13a and 13b, Appendix C). These application rates confirm the original identified receiving landbase is sufficient for agronomic application of the sludge.

  The Proponent presents the application rate determinations in Tables 13a and 13b (Appendix C) for TAC review purposes only. Based on timing of the original sludge and soil sampling activities in 2010 relative to the planned sludge application in 2011, the Proponent commits to re-sampling sludge and receiving land soils in 2011 to support field-specific prescriptive application rate determinations. The application rate determination tables presented here will be used as templates for determining if P-based or N-based sludge applications are most appropriate and for determining

field-specific sludge application rates for the receiving lands. The Proponent recommends that the submission of these application rates prior to sludge application be a condition of the Licence.

- (Section 2.1.2) - Based on the soil test results and sludge test results, a 100 kg/ha nitrogen application would not be appropriate. The statement regarding the 100 kg/ha application rate found in Section 7.3.1 (p. 7.3) of the Environment Act Proposal was vague and used only as a preliminary maximum nitrogen application rate for planning purposes to determine the total landbase requirements for the sludge application.

  Based on the discussion in 2.1.1 above regarding the use of P-based application rates and total phosphorus, it is anticipated that the available nitrogen application rates would be 10 kg/ha or less for the North Stockpile, and less than 20 kg/ha for the South Stockpile (Tables 13a and 13b, Appendix C).

<u>August 23, 2010 – Following review of DRAFT Licence</u>

Manitoba Water Stewardship has reviewed the referenced file, forwarded for comment on August 16, 2011.

- *Manitoba Water Stewardship requires the following:*
  - *Amend Clause No. 16 to the following:*
    - *The Licencee shall not exceed an application rate of sludge solids onto the land of 15 tonnes per hectare, on a dry weight basis, and shall apply sludge solids such that the amounts of residual nitrate-nitrogen in the 0-24 inch soil depth and Olsen-P phosphorus in the 0-6 inch soil depth do not exceed the limits of the most limiting Nutrient Management Zone, regardless of size, set forth in the Nutrient Management Regulation under The Water Protection Act. Annual post harvest soil testing of each field for Nitrate-N (0 – 24") and phosphorus using the Olsen-P test (0 – 6") is required for 3 years following biosolids application. Additionally, the proponent is asked to supply information from the producer regarding the amounts of nutrients from other sources (fertilizer, manure, etc) being added to the field. The soil test, fertilization, and cropping information shall be submitted to Manitoba Water Stewardship on or before the 15th day of March of each year.*
  - *Amend Clause No. 17 to the following:*
    - *The Licencee shall not permit the application of sludge solids:*
      - *a) Between November 10th of any year and April 10th of the following year;*
      - *b) to frozen soil;*
      - *c) less than 300 metres from any occupied residence (other than the residence occupied by the owner of the land on which the sludge solids are to be applied);*
      - *d) less than 1 kilometre from a residential area;*

- *e) less than 15 metres from a first order waterway;*
- *f) less than 30 metres from a second, or higher order waterway;*
- *g) less than 50 metres from any groundwater well;*
- *h) on land designated as being in Nutrient Management Zone N4 (Section 3(1) of the Nutrient Management Regulation under The Water Protection Act); or,*
- *i) on land that is subject to flooding.*

Disposition:

- The draft Environment Act Licence contains clauses which;
  - cause the Licencee to apply the sludge solids to areas within the designated area which are not subject to flooding;
  - require that the sludge solids remain the furrow opening; and
  - require that the surface expression of the sludge solids is acceptable to an Environment Officer.
- Minimum setbacks from any occupied residence, residential area, waterways and groundwater wells are designated in the draft Environment Act Licence.
- The draft Environment Act Licence contains a Clause that requires the Licencee, during all sludge land activities, to comply with the requirements of *Manitoba Regulation 62/2008* respecting *Nutrient Management Regulation* or any future amendment thereof.
- The draft Environment Act Licence contains Clauses that require the Licencee to remove, transport, and incorporate the sludge solids into the soils in such a manner as to prevent the disruption of natural wildlife and fish habitats.
- The draft Environment Act Licence was adjusted to include suggested changes by Manitoba Water Stewardship and the proponent's consultant such that the application rate of sludge solids is not specifically restricted by a subjective limit. Rather, the criteria set out in *Manitoba Regulation 62/2008* respecting *Nutrient Management Regulation* provide controls and limits.

COMMENTS FROM FEDERAL REPRESENTATION:

Canadian Environmental Assessment Agency

August 16, 2010

- *Based on the responses to the survey the application of the Canadian Environmental Assessment Act (the Act) by a federal authority will not be required for this project.*

PUBLIC HEARING:

A public hearing was not requested.

RECOMMENDATION:

The Proponent should be issued a Licence to transfer sludge solids that is currently stockpiled at the Grey Owl Landfill located in NE 4-20-18 WPM for incorporation on the proposed receiving land locations subject to the specifications, limits, terms and conditions of the Licence. The Licence should be assigned to the Western Region.

PREPARED BY:

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September 12, 2011

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