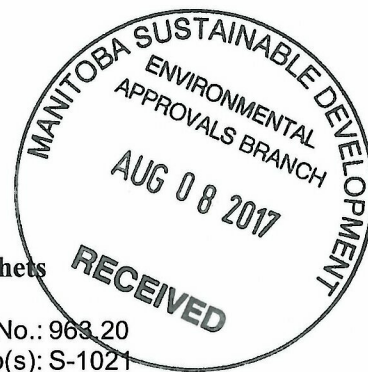


AUG 01 2017



Water and Waste Department • Service des eaux et des déchets



Client File No.: 963.20  
Our File No(s): S-1021  
020-17-08-11-00  
020-17-08-11-0N

Manitoba Sustainable Development  
Climate Change and Environmental Protection Division  
Environmental Approvals Branch  
Suite 160 – 123 Main Street (Box 80)  
Winnipeg, MB R3C 1A5

Attention: Ms. Tracey Braun, M.Sc., Director

Dear Ms. Braun:

**RE: NOTICE OF ALTERATION, ENVIRONMENT ACT LICENCE NO. 1089 E RR  
BIOSOLIDS LAND APPLICATION – FIELD STORAGE ASSESSMENT  
CLIENT FILE NO. 963.20**

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Further to the Notice of Alteration for Environment Act Licence No. 1089 E RR, the City proposes to conduct an assessment of different options for biosolids field storage as part of the land application pilot program. The purpose of the assessment is to determine the feasibility of field storage for the annual biosolids land application program.

The City's approach to field storage will be consistent with the best management practices outlined in the CCME Guidance Document for Beneficial Use of Biosolids (2012) and the US EPA Guide to Field Storage of Biosolids (2000).

The biosolids field storage assessment will comply with all applicable regulations, including the provincial Nutrient Management Regulation, the Water Protection Act, the Environment Act, the Livestock Manure and Mortalities Management Regulation and the Workplace Safety and Health Act.

The details of the biosolids field storage assessment are outlined in the attached memo from WSP, including the quantity of biosolids, location, timeline and the plan for odour monitoring, storm water monitoring and soil sampling.

Should you have any questions or require additional information, please contact Duane Griffin at (204) 986-4483 or at [dgriffin@winnipeg.ca](mailto:dgriffin@winnipeg.ca). Thank you for your consideration.



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Yours truly,



for/A/ Chris Carroll, P. Eng., MBA  
Manager of Wastewater Services Division

AEW/jl

Attachment

- c: M.L. Geer, CPA, CA, Water and Waste Department (email)
- G.K. Patton, P.Eng., Water and Waste Department (email)
- D.E. Griffin, P.Eng., Water and Waste Department (email)
- D. Keam, WSP Global Company (email)



## CITY OF WINNIPEG PHASE 2 BIOSOLIDS LAND APPLICATION PILOT - FIELD STORAGE ASSESSMENT

### PROBLEM STATEMENT :

In the full City of Winnipeg Biosolids Land Application Program it is anticipated that approximately 20,000 wet tonnes of Class B biosolids will be land applied annually. The NEWPCC produces nearly 4,000 wet tonnes monthly and can only house a minimum volume on-site. This requires the biosolids produced between May and September (start of land application program) to be hauled daily (between 6 and 12 trucks daily) from the NEWPCC to a temporary storage facility(s) until land application can proceed after crop harvest.

### OBJECTIVE STATEMENT:

To provide environmentally safe field storage for biosolids from the NEWPCC on an annual basis during the growing season. The City's approach to field storage will be consistent with the best management practices outlined in the CCME Guidance Document for Beneficial Use of Biosolids (2012) and the US EPA Guide to Field Storage of Biosolids (2000).

The biosolids field storage assessment will comply with all applicable regulations, including the provincial Nutrient Management Regulation, the Water Protection Act, the Environment Act, the Livestock Manure and Mortalities Management Regulation and the Workplace Safety and Health Act.

It is anticipated that the application fields will be established on a rotation basis (1 in 3 or 4 years) and therefore field storage requirements would follow the same rotation. The objective of this assessment is to evaluate one control and four field storage options with mitigations to protect the environment against potential impacts. The assessment will evaluate for:

- ❖ Odour Management
- ❖ Stormwater Management
- ❖ Vector Control

Also to be included in the assessment will be:

- ❖ Logistics of Management

### SITE DETAILS

Cooperating Farm Producer	Anticipated Land Location	2017 Crop	2018 Crop	Limitations
Brad Erb Brad Erb Farms Ltd.	City owned land south of West End Sewage Treatment Plant (WEWPCC) SE-11-10-01E Site is on west edge of field.	Summer fallow	Wheat	None

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## FIELD STORAGE OPTIONS AND FEATURES

In-Field Storage Options	Design Criteria	Volume / Size	Pre-establishment requirements
<b>Earth berm with no cover (Control)</b>	<p>With rubber tire loader, develop an earth berm to approximately 0.6 m above grade on three sides.</p> <p>Leave one side open for stockpile access, when complete close off the fourth wall with earth.</p> <p>Cover berms with poly cover to prevent mixing.</p>	<p>Biosolids Volume: 25 tonne / 25 m<sup>3</sup> (1 truck)</p> <p>Berm height: 0.6 m</p> <p>Estimated stockpile height: 0.7 m</p> <p>Area inside berm: 6 m x 6 m = 36 m<sup>2</sup></p>	<p>Soil sample the containment area floor (0-15 cm) and subsoil (15-60 cm) prior to site establishment and post removal. Soil sampling will be completed, details outlined below.</p>
<b>Earth berm with straw cover</b>	<p>With rubber tire loader, develop an earth berm to approximately 0.6 m above grade on three sides.</p> <p>Leave one side open for stockpile access, when complete close off the fourth wall with earth.</p> <p>Cover biosolids with straw to a minimum of 0.1 m and blow over a hydromulch.</p> <p>Cover berms with poly cover to prevent mixing.</p>	<p>Biosolids Volume: 25 tonne / 25 m<sup>3</sup> (1 truck)</p> <p>Berm height: 0.6 m</p> <p>Estimated stockpile height: 0.7 m</p> <p>Area inside berm: 6 m x 6 m = 36 m<sup>2</sup></p>	<p>Soil sample the containment area floor (0-15 cm) and subsoil (15-60 cm) prior to site establishment and post removal. Soil sampling will be completed, details outlined below.</p>
<b>Earth berm with hydromulch cover</b>	<p>With rubber tire loader, develop an earth berm to approximately 0.6 m above grade on three sides.</p> <p>Leave one side open for stockpile access, when complete close off the fourth wall with earth.</p> <p>Cover biosolids with a hydromulch.</p> <p>Cover berms with poly cover to prevent mixing.</p>	<p>Biosolids Volume: 25 tonne / 25 m<sup>3</sup> (1 truck)</p> <p>Berm height: 0.6 m</p> <p>Estimated stockpile height: 0.7 m</p> <p>Area inside berm: 6 m x 6 m = 36 m<sup>2</sup></p>	<p>Soil sample the containment area floor (0-15 cm) and subsoil (15-60 cm) prior to site establishment and post removal. Soil sampling will be completed, details outlined below.</p>
<b>Earth berm with lime mud cover</b>	<p>With rubber tire loader, develop an earth berm to approximately 0.6 m above grade on three sides.</p> <p>Leave one side open for stockpile access, when complete close off the fourth wall with earth.</p>	<p>Biosolids Volume: 25 tonne / 25 m<sup>3</sup> (1 truck)</p> <p>Berm height: 0.6 m</p> <p>Estimated stockpile height: 0.7 m</p>	<p>Soil sample the containment area floor (0-15 cm) and subsoil (15-60 cm) prior to site establishment and post removal. Soil sampling will be completed, details outlined below.</p>

	<p>Cover biosolids with a lime mud to sufficiently cover the storage pile.</p> <p>Cover berms with poly cover to prevent mixing.</p>	<p>Area inside berm: 6 m x 6 m = 36 m<sup>2</sup></p>	<p>below.</p>
<p><b>Earth berm with wood chips</b></p>	<p>With rubber tire loader, develop an earth berm to approximately 0.6 m above grade on three sides.</p> <p>Leave one side open for stockpile access, when complete close off the fourth wall with earth.</p> <p>Cover biosolids with wood chips to visibly cover the pile.</p> <p>Cover berms with poly cover to prevent mixing.</p>	<p>Biosolids Volume: 25 tonne / 25 m<sup>3</sup> (1 truck)</p> <p>Berm height: 0.6 m</p> <p>Estimated stockpile height: 0.7 m</p> <p>Area inside berm: 6 m x 6 m = 36 m<sup>2</sup></p>	<p>Soil sample the containment area floor (0-15 cm) and subsoil (15-60 cm) prior to site establishment and post removal. Soil sampling will be completed, details outlined below.</p>
<p><b>Earth berm with poly cover</b></p>	<p>With rubber tire loader, develop an earth berm to approximately 0.6 m above grade on three sides.</p> <p>Cover berms with poly cover to prevent mixing.</p> <p>Leave one side open for stockpile access, when complete close off the fourth wall with earth.</p> <p>Cover biosolids with poly plastic covering over the berm.</p> <p>Weight down the poly plastic with tires or sandbags.</p>	<p>Biosolids Volume: 25 tonne / 25 m<sup>3</sup> (1 truck)</p> <p>Berm height: 0.6 m</p> <p>Estimated stockpile height: 0.7 m</p> <p>Area inside berm: 6 m x 6 m = 36 m<sup>2</sup></p>	<p>Soil sample the containment area floor (0-15 cm) and subsoil (15-60 cm) prior to site establishment and post removal. Soil sampling will be completed, details outlined below.</p>
<p><b>1 tonne tote with plastic liner</b></p>	<p>Fill 12 tonne tote and tie off tight to solids.</p>	<p>Biosolids Volume: 1 tonne / 1 m<sup>3</sup> x 12 totes = 12 m<sup>3</sup></p> <p>Berm height: None</p> <p>Estimated stockpile height: 1.0 m</p>	<p>Soil sample the containment area floor (0-15 cm) and subsoil (15-60 cm) prior to site establishment and post removal. Soil sampling will be completed, details outlined below.</p>



## SPECIFICS

- ❖ The field storage assessment will be approximately 4 weeks in duration, planned to start in September 2017. The field storage assessment will be running concurrently with the biosolids land application pilot program.
- ❖ The land selected for the field storage assessment is the City owned land located southwest of the West End Sewage Treatment Plant (WEWPCC) - SE-11-10-01E. Biosolids will not be applied to this land during the storage assessment, in order to accurately evaluate odour from the storage sites.
- ❖ Each one of the field storage options will be located in areas that meet the following criteria:
  - Locate biosolids storage area at least 100 m from any surface water course, sinkhole, and spring or well and in a manner that does not cause pollution of surface water, groundwater or soil.
  - Locate biosolids storage area at a site with the presence of clay and clay till to a depth of 1.5 m.
  - Locate biosolids storage area at least 1600 m from designated residential area, 300 m from a residence, at least 30 m from property line with residence and at least 15 m from property line without residence.
  - Locate biosolids storage options at least 100 m from each other in order to provide sufficient separation distance for odour assessment.
  - Locate biosolids storage options in a north – south direction to limit prevailing winds (west) during odour assessments.

## SOIL SAMPLE AND ANALYSIS

Within the footprint of each storage unit, soil samples will be collected during the development stage (no-biosolids) and again after the biosolids have been removed and the site is being reclaimed. Soil sampling and analysis is as follows:

- ❖ Soil samples from 0 – 15 cm would be analyzed for:
  - PH, EC
  - POTASSIUM
  - NICKEL
  - MERCURY
  - ZINC
  - TOTAL PHOSPHORUS
  - SODIUM BICARBONATE
  - EXTRACTABLE PHOSPHOROUS
  - CADMIUM
  - CHROMIUM
  - COPPER
  - LEAD
  - ARSENIC
- ❖ Soil samples from 0 -15 and 15 – 60 cm would be analyzed for:
  - Nitrate nitrogen
  - Total nitrogen
  - Ammonia nitrogen



## **ODOUR MONITORING PROCEDURE**

Evaluation of the potential odour annoyance for each of the field storage options is a key component of the field storage assessment. To ensure consistency for site visit observation of odour, a template will be developed for the assessors to follow.

### **SPECIFICS :**

- ❖ Odour assessment to be evaluated four times - 1 baseline (at site with no biosolids present) and six field assessment events by different panels over a period of four weeks and different weather conditions if possible.
- ❖ Odour Assessment Panels will consist of:
  - City of Winnipeg / WSP (Bias)
  - Capital Region attendees and MSD regulators
  - Rural Municipality Council members

The intent is to have 2 to 3 consistent individuals attend each odour assessment event. At least one panel member from each of the panels to attend on three separate occasions.

- ❖ Method of Odour Assessment<sup>1</sup>:
  - The objective is to assess odour intensity; the odour assessors would be asked to wear a 3M 8247 Particulate Respirator R95 filtered mask (suitable for nuisance level organic vapour relief).
  - Assessments will occur at each of 4 pre-determined distances from the stock piles (100 m, 50 m, 25 m, and 10 m), generally down wind of each stockpile. Assessors will start at the farthest distance point (100 m) and move forward to each distance point in sequence. At each distance point:
    - Each odour assessor wears the carbon filtered mask for about two minutes to clear their nose.
    - The assessor removes the mask and breathes normally to evaluate and assigns a level of annoyance to the odour.
  - Assessor opinions on the degree of odouriferousness would be determined on a scale of 0 to 5 (0 = no odour, 1 = slight annoying, 3 = Annoying, 4 = Very Annoying and 5 = extremely annoying). Each assessor will evaluate the odouriferousness on their own accord.
  - Climatic conditions will be recorded (temperature, wind speed, direction, humidity etc.).

## **STORMWATER MANAGEMENT AND VECTOR CONTROL**

To ensure consistency for site visit observation of stormwater management and vector control, a template will be developed for the assessors to follow.

Detailed notes on storage option conditions will be maintained including: the condition of cover, seepage, soil conditions and weather. Following any rainfall event, observations should be made as to the condition of the sites, biosolids, ponding water, estimates of volume or extent and how wet the biosolids appear to be as well as an evaluation of odour.

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<sup>1</sup> Assessment procedure initially developed by Zhang (2002) and adapted to irrigation odour assessment methodology by D.Keam, Master of Science Thesis study (2010).



Observations should also be made regarding the intensity of flies and other insects or rodents present at the storage sites. Observations should include; swarming, staging, sounds and other factors that may influence presence or absence.

#### **COOPERATING FARM PRODUCER SITE SUITABILITY**

WSP will extend an invitation to cooperating farm producers to visit the field storage sites so they may make their own observations as to the suitability of the different options. However, the fall season is an extremely busy time for producers and this may not be well attended, therefore the five options will be fully documented and photographed to establish a storyboard of the logistics of developing, maintaining and operating each of the field storage options.

Post - harvest cooperating producers will be approached to ask for their concerns regarding the field storage options. Their comments will be documented and reported back to the City through the Summary Letter Report.

#### **DELIVERABLE**

WSP will provide a written Summary Letter Report to the City following the field storage assessment that will provide:

- ❖ An outline of the methods, materials and observations required to develop, operate and reclaim each storage option;
- ❖ A summary of soil results pre/post establishment of each storage option;
- ❖ A summary of methods, materials and observations for the odour monitoring program;
- ❖ A summary of methods, materials and observations for the stormwater management and vector control program;
- ❖ A summary cooperating farm producer concern (if any) regarding field storage options; and,
- ❖ A summary of costs for the establishment, maintenance, operations and reclamation for each storage option of 20,000 wet tonnes annually.