



Water and Waste Department • Service des eaux et des déchets

Hog Disposal Above Ground Burial Pilot Project

July 2020

Prepared For:

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



Water and Waste Department • Service des eaux et des déchets

Proposal

Background:

The City of Winnipeg (The City), in partnership with Manitoba Agriculture and Resource Development (ARD) is investigating alternative hog disposal options at Brady Road Resource Management Facility. The City landfills approximately 13,000 tonnes of animal mortalities a year and has limited capacity to accept larger volumes. Additional management options may be required for potential mass mortality events. The objective of this study is to evaluate the potential of above ground burial as an operationally viable and environmentally sustainable option for the management of hog mortalities in terms of simplicity, odour, nutrient movement and the ability to return the land back to its original land use.

Landfilling animal mortalities contributes to odour, leachate and landfill gas production, and the loss of nutrients. Landfilling animal mortalities requires a waste ration of two parts garbage to one-part animal mortality. As such, the total volume of animal mortalities which can be landfilled is limited.

Manitoba Agriculture and Resources has been working with stakeholders in the development of an emergency response plan to a potential hog pandemic. This response is anticipated to require the management of a large volume of animal mortalities over a relatively short period of time.

Results from this pilot project will be used to inform the emergency response planning by Manitoba Agriculture and Resources, and animal mortalities management planning at BRRMF.

Objective Statement:

The objective of this two year pilot project is to determine if above ground burial is a viable option for managing animal mortalities.

Overview:

A minimum of twelve above ground burial (AGB) treatments will be implemented and monitored over a two year time frame. The AGB technique is based on the research from South Dakota State University (Flory et al., 2017) and involves a shallow trench lined with a carbon source. Hog mortalities will be placed in a single layer on the carbon source, and covered with the trench backfill. This is designed to keep the hog mortalities in the aerobic zone, allowing for aerobic decomposition while containing material and mitigating odours, vectors and GHG emissions. The pilot area will be restricted access. The AGB trenches will be monitored for



Water and Waste Department • Service des eaux et des déchets

settlement, cracking, temperatures, and decomposition. Additional monitoring will include surface water, soil, vegetation, and vectors.

Environmental Protection

Consideration has been given to minimize the risk of adverse impacts on the environment through the following considered design and monitoring components:

- The project is located within the boundaries of the BRRMF with existing controls including surface and ground water monitoring, odour monitoring, vector management, and site security.
- Regular monitoring over a two year period will enable a strong assessment of potential impacts from trenches.
- Chicken wire will prevent scavengers from digging up the pilot trenches. The trail camera will capture potential scavenger activity to inform risk assessments for future implementation.
- The pilot area will be location close to the active area of the landfill which will allow for regular surveillance from City staff. The area will also be restricted and clearly defined to prevent unauthorized entry.
- Hog mortalities used in this project will not be diseased.
- If the pilot project needs to be stopped for any reason, all material will be excavated and buried in the landfill tipping face. The excavated area will be backfilled with clean fill, and the surface water containment system removed.

Design

A minimum of twelve shallow burial trenches approximately 2.5 m wide x 0.5 m deep x 10 m long will be constructed in the licensed area at Brady (Appendix A). The trenches will be spaced five meters apart, and seven meters from the pilot area boundaries. The twelve trenches will each examine a different treatment. The nine treatments include:

1. Nursey hog carcasses and woodchips (NW),
2. Feeder hog carcasses and woodchips (FW),
3. Nursey hog carcasses and woodchips (NWS) and seeded,
4. Feeder hog carcasses and woodchips and seeded (FWS),
5. Nursey hog carcasses and straw (NS), and
6. Feeder hog carcasses and straw (FS).
7. Ground nursery hog carcasses and woodchips (GNW)



Water and Waste Department • Service des eaux et des déchets

8. Ground feeder hog carcasses and woodchips (GFW)
9. Ground nursely hog carcasses and woodchips and seeded (GNWS),
10. Ground feeder hog carcasses and woodchips and seeded (GFWS),
11. Ground nursely hog carcasses and straw (GNS), and
12. Ground feeder hog carcasses and straw (GFS).

Wood chips, feeder hog and nursery hog treatments will test treatments most likely to be implemented at BRRMF. Straw is a carbon source more likely to be used on a farm setting. Ground hog carcasses will be tested to see if decomposition time can be reduced. Leaf and yard waste compost may be added to trenches to 'seed' biological activity.

Construction

Trenches will be excavated with an excavator with soil stockpiled at the edge of the trench. The trenches will be filled with a minimum of 30 cm of wood chips or straw. Hog mortalities will be delivered to the site and dumped into the trench. The excavator will be used to spread out the mortalities in a single layer. The excavator will then be used to cover the trenches with the excavated soil.

For the ground mortalities trenches, the construction of the trench will be the same. Hog mortalities will be delivered to the site and dumped close to the trench. Hog mortalities and wood chips will be put through a grinder, with the output directed into the trench. The excavator will be used to spread out the material in an even layer and covered with the stockpiled soil.

All trenches will be covered with chicken wire.

The pilot area will contain and surface water with a boundary berm and ditch system.

Location

The pilot area will be west of the north haul road and north of the equipment road (Appendix A). This area is accessible by heavy equipment and close to the active landfilling area. The land is relatively undeveloped and is vegetated with volunteer prairie and weed species. The area is planned for future landfilling and has over 10m of clay over a non-potable aquifer.

Materials

Wood chips will be provided from the wood waste management area of BRRMF.

Straw will be provided by ARD.

Hog mortalities will be delivered to the site when needed. Mortalities will be stockpiled and refrigerated until the trenches are prepared so trenches can be filled and covered on the same



Water and Waste Department • Service des eaux et des déchets

day. It is anticipated that trenches with intact hog mortalities will be filled in one day, and trenches with ground mortalities will be filled on a separate day.

Environmental Monitoring

This project will examine the viability of managing hog mortalities with an above ground burial system. Consideration has been given to minimize the risk of adverse impacts on the environment through the following monitoring components.

Trenches

Measurements will be taken of the initial trench height, and two to three times throughout the year to record any settlement.

Temperature measurements will be taken by ARD from the mortality layer over the course of the pilot project. The trenches will be inspected by ARD weekly the first month to identify and address any cracks in the soil cover.

Trenches will be inspected weekly for the first four weeks to see if there is evidence of animal activity. The trail camera footage will also be reviewed.

Three months after construction, a portion of the soil cover from each of the twelve trenches will be removed to visually assess the degradation of the carcasses. The cover will then be replaced.

One year after construction, and after soil sampling, the trenches will be regraded and return to its original land use. Any bones remaining on the soil surface will be noted. Two years after construction, the area will be excavated to assess soil quality and the presence and state of any bones.

Surface Water Sampling

Surface water samples will be collected from a swale created along the perimeter of the pilot area. In order to minimize any confounding factors caused by stagnant water, sampling will occur within 24 hours of a rainfall or runoff event, when steady downstream flow can be observed in a swale designed to catch runoff. Samples will be tested for:

- Dissolved ammonia
- Dissolved nitrate-nitrite nitrogen
- Total Kjeldhal nitrogen
- Dissolved phosphorous (as orthophosphate)



Water and Waste Department • Service des eaux et des déchets

Surface water sampling results will be compared with the Manitoba Water Quality Standards, Objectives, and Guidelines and analyzed for dissolved nitrogen and phosphorus. The first two water samples will be collected within approximately one week and one month after trench construction, if conditions permit. Additional sampling events will occur after major rainfall events, and during spring runoff with a maximum of 10 rain events per year.

Soil Sampling and Analysis

The soil samples within pilot area will be collected using a stratified-randomized design. The pilot area will be stratified into four quadrants, and one composite soil sample consisting of five randomized subsamples will be collected. All soil samples will be collected from 0-15 cm and 30-60 cm depths and analyzed for the following:

- Organic matter, total organic carbon
- Ammonium, nitrate, total Kjeldhal nitrogen (TKN)
- Available phosphorous, sulfur, potassium
- Trace elements (arsenic, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, zinc)
- pH, electrical conductivity

The second soil sampling even will be conducted one year after trench construction. Trenches will be sampled using a stratified-randomized design of each trench foot print. Samples will be taken the third time 24 months after trench construction. Soil samples will be compared to the baseline of the first composite soil sample results. Samples will be sent to a third-party lab for analysis.

Vegetation

Four of the trenches will be seeded with a grass species. Other trenches will be left to volunteer species. Vegetation monitoring will be conducted twice annually. An assessment of the aboveground biomass will be done using a visual determination of density.

Vectors

Trenches will be covered by chicken wire to prevent scavenging. The pilot area will be monitored with a trail camera. Trenches and camera footage will be monitored on a regular basis.

Odour Monitoring

Evaluation of potential odour issues will be completed as part of the BRRMF odour monitoring program. One odour collection point at the pilot area will be added to the program for the duration of the pilot project. Any odours will be described and addressed accordingly.



Water and Waste Department • Service des eaux et des déchets

Site Security

The pilot project will be conducted entirely within the secure site of BRRMF. The pilot area is separate from the operational, publicly accessible areas, but close enough to be regularly observed by City staff. Signage will further identify the area as restricted. After the construction of the trenches, access will be physically restricted to prevent equipment from entering or driving over the site.

Communication over the Two Year Pilot Project

As part of this pilot project the City proposes to provide MSD with the following reports:

- **Annual Report** – To be delivered within three months of the first pilot year
- **Final Report** – To be delivered within six months of the completion of the two year pilot project.

References

Flory GA, Peer RW, Clark RA, Baccar MN, Le TT, Mbarek AB, Farsi S (2017) Aboveground burial for managing catastrophic losses of livestock, *Int J One Health* 2017;3:50-56.