Water and Waste Department • Service des eaux et des déchets

Summit Landfill Soil Fabrication Pilot Project

Year One Phase Two Interim Report

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Prepared For:

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Introduction

On May 7, 2018 the City of Winnipeg, Solid Waste Services (SWS) received approval from Manitoba Sustainable Development (MSD) to commence the three year Summit Soil Fabrication pilot project, 2018-2020, examining the viability of fabricating soil with biosolids to complete the cap system at Summit Landfill. This interim report covers the activities since Year One Phase One (Y1P1), including the initial preparation work and results from the second operational phase, Year One Phase Two (Y1P2). The main goals for Y1P2 were to improve operational efficiency, create windrows appropriate for a pull-behind windrow turner, and test operations in autumn conditions.

The main findings from Y1P2 are:

- Autumn cold weather conditions (0 to -15C) are conducive to soil fabrication
- Windrows made in a 'taco' style retain their shape better than layered piles, and reduce movement of biosolids within the windrow
- A manure spreader can adequately produce a secondary mix and spread soil to the required depth,
- One full-time and one part-time 5 yard loader is enough to manage all biosolids during the operational phase

Activities since Y1P1

Wood and Wood chips

Wood chipping operations started at Summit in July of 2018. All wood chips from this operation were directed to the soil fabrication pilot project. City crews and contractors also dumped wood chips at Summit in designated areas. These activities are anticipated to continue throughout the pilot project. Wood chip volumes on site were reviewed and determined sufficient to meet the needs of Y1P2.

Sweepings

Street sweepings from the City of Winnipeg street maintenance operations were dumped, screened and windrowed from May to November, 2018. Street sweepings will be managed on site again in 2019.

An excavator was used to break up and windrow the 2017 street sweepings. A loader was used to move and organize feedstocks around the mixing area.

Spreading of Y1P1 Windrows

Windrows were stockpiled over the summer and autumn. Based on drone surveys, windrows had a volume reduction of approximately 30% between June 2018 and November 2018.

A manure spreader was used to spread Y1P1 windrows on the designated plot starting October 1, 2018. Soft and wet conditions slowed down operations in October. Below freezing temperatures made spreading the material easier in November. Rocks and debris from the cap which was mixed into the fabricated soil with the excavator in Y1P1 created problems for the spreader. The spread soil was very 'fluffy' from being spread with the manure spreader. To compensate for anticipated settlement, soil was spread to 90 cm deep. Grade stakes were place and settlement will be measured in the spring.

Spreading and seeding was not complete before significant cold temperatures and snow fall, so no seeding was done in 2018. Seeding will be done in late winter to provide seeds with a cold weather stratification needed for germination.

Environmental Monitoring

Wood chip stockpiles and fabricated soil windrows temperatures continue to be checked weekly. No odour was detected from the windrows.

Swales in control plot and soil fab plot were checked after significant rain events for run-off. There was no run-off in the swales over the summer.

Operations

The biosolids receiving operation phase started on November 5th, 2018 and was completed November 30th, 2018. Over the course of these 20 working days 3,435.48 tonnes of biosolids were received at Summit Landfill and mixed into an initial soil blend. All biosolids produced during the operational phase were accepted in the soil fabrication process. Site layout from the operation can be found in Appendix A.

The soil blend of 1(biosolids):2(wood chips):3(sweepings) determined by bench scale testing and used in Y1P1 was continued in this phase. Windrows were constructed differently based on observations of Y1P1 windrows over the summer, manure spreading operations, and size requirements for a pull-behind windrow turner. While Y1P1 windrows were constructed with a 'beaver hut' or 'ratio pile' style with heights up to 4m and widths of 6m, Y1P2 windrows were constructed with a 'taco' style with height up to 2.5m and widths of 4m. This 'taco' style reduces the slumping of biosolids down the sides of the windrows, reduces exposure of biosolids on the outside of the piles, and maintains the size required for the windrow turner. Additionally, this style of windrow reduces the risk of bringing up rocks from the

cap and mixing it into the soil itself. Photos and descriptions of the construction of the different windrow styles can be found in Appendix B.

Due to the smaller size of the Y1P2 windrows, and the space required between windrows to accommodate a pull-behind turner, the mixing and stockpiling area for Y1P2 is close to twice as large as for Y1P1. Using a windrow turner and dozer spreading method however, will allow the soil to be spread in place. That is, the stockpiling area and the spreading area for the soil is closer to a 1:1 ratio, compared to the Y1P1 operation.

Next Steps

Windrows will be left in place until spring of 2019, when they will be spread with a combination of a manure spreader and a pull behind windrow turner. The spread soil will be seeded by Naturalist Services Branch. Turning and spreading the fabricated soil after it has thawed completely will be better for the equipment selected. Soil samples will be taken during the spreading phase in spring.

Environmental Results

Odour

Biosolids odour was detected in the operating area. Odours were observed to be reduced after mixing biosolids with woodchips and street sweepings. No odours were detected offsite during the biosolids receiving operations.

Soil

Soil will be sampled after spreading in spring of 2019.

Surface Water

The project is located within the boundaries of the Summit Road Landfill leachate and surface water collection and containment system. Surface water will be sampled after the material is spread. The first samples will be taken in spring of 2019. The Y1P1 swale will be sampled during the snow melt, and the Y1P2 plot will be sampled after spreading and seeding.

Vectors

No vectors were observed during the operational phase.

Dust, noise, nuisance

There were no dust, noise or nuisance concerns during operations.

Site Security and Safety

Safe Work Procedures were reviewed every week with staff and followed at Summit. All personnel onsite were required to wear appropriate PPE, this included safety glasses and High Visibility rain jackets when appropriate to mitigate any weather hazards. No safety or emergency incidents occurred during Y1P2.

Year Two Phase One (Y2P1)

Y2P1 will take place from February 4 to March 29, 2019. Based on results from Year One and continued research, two loaders, one which is part time, with a five yard bucket will be used to make taco windrows and placed to allow for secondary mixing by a windrow turner. City staff and equipment may be used. Seeding will take place in spring of 2019.

Regulatory Approval

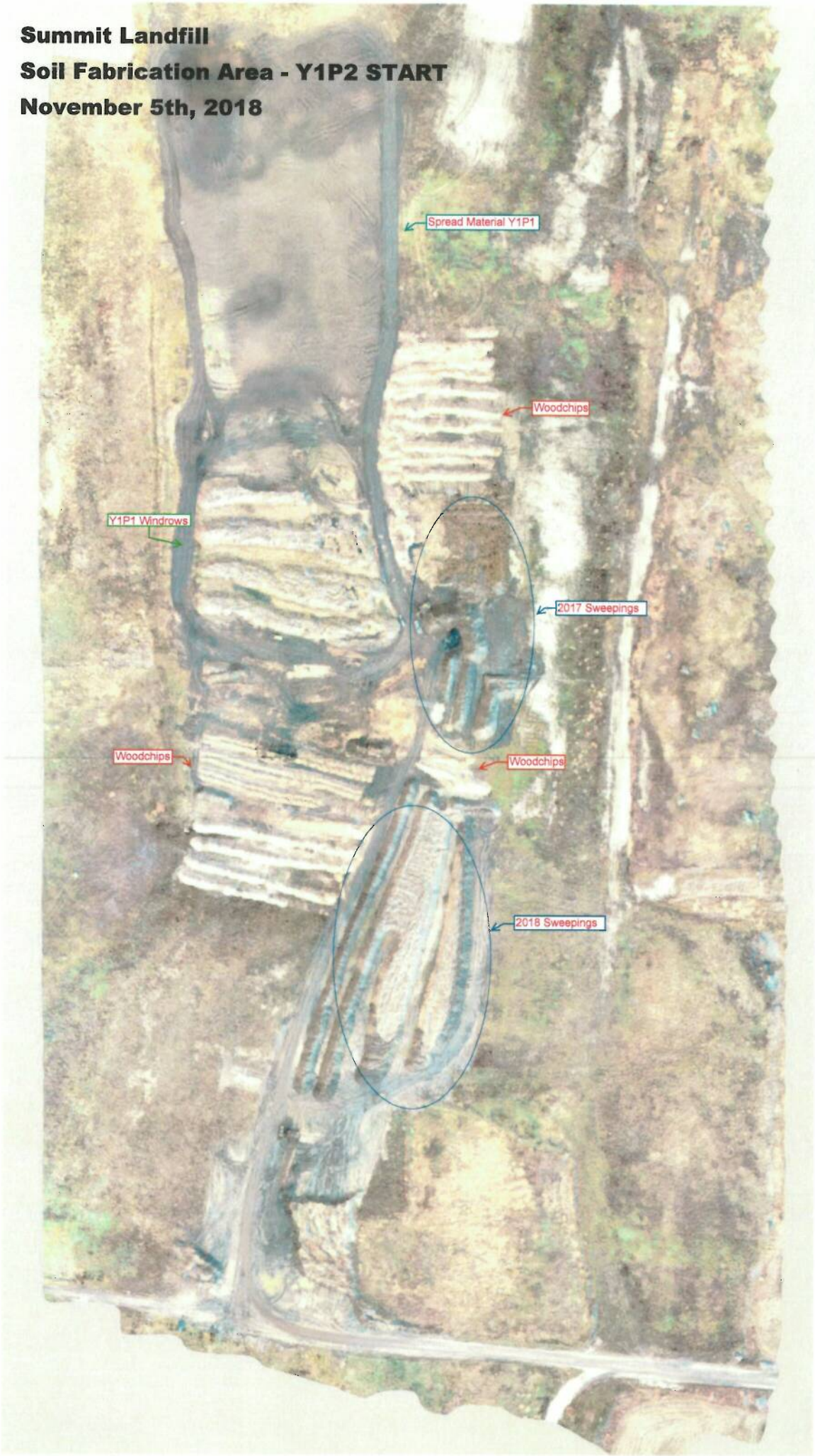
Approval to proceed with the Summit Soil Fabrication Pilot Project under the Exemption Clause (6) of the *Classes of Development Regulation* was received on May 7, 2018. In accordance with this approval:

- Notice was given to MSD five days before the commencement and five days before the end of the operational phase
- The quantity of biosolids in the operational phase did not exceed 4,000 m^3
- Biosolids were mixed with feedstocks each day received, and no biosolids were stockpiled overnight
- Site access was limited to authorized persons, with signage delineating soil fabrication areas
- Surface water and vectors were managed on site.

Summit Landfill

Soil Fabrication Area - Y1P2 START

November 5th, 2018



Summit Landfill

Soil Fabrication Area - Y1P2 FINAL

December 10th, 2018

Year One - Ratio Pile Formations

"Beaver Hut" Formation vs. "Taco" Windrows.

With the beaver hut style of ratio piles the wood chips were placed directly at the base of the pile. Either on the ground or on top of an existing pile.

Biosolids are placed directly on top of the wood chips

Street sweepings are placed on top of the biosolids.
The issue with this is that the sweepings push the biosolids over the woodchips and out the side of the pile, resulting in exposed biosolids.

With the taco style of ratio piles, the wood chips are placed side by side. Creating an envelope for the biosolids to sit in.

Biosolids are placed in the middle of the woodchips

Street sweepings are than placed on top of the biosolids covering all of the material. This reduces the risk of biosolids seeping out of the piles.