Niverville Lagoon – Decommissioning Project
Environmental Act License No. 2712

Report on 2015 Activities

Prepared by Native Plant Solutions, January 2016

This report provides an update on the progress of the project to decommission the wastewater treatment lagoon located on SW 30-7-4EPM in the Town of Niverville under the Notice of Alteration to the Town of Niverville, Environment Act License No. 2712.

2015 Activities

Graduate Student Research

Nicholson Jeke began his PhD research program in 2015 under the direction of Dr. Francis Zvomuya in the Department of Soil Science at the University of Manitoba. Mr. Jeke's PhD research is continuing the study of lagoon remediation through cattail biomass harvesting which began with his now complete MSc research. In 2015, Mr. Jeke sampled water, sludge, and cattail in the wetland cell and biosolids and cattail in the dry cell. Data collected in 2015 will be used to evaluate cattail biomass yield and nutrient accumulation, sediment and water column nutrient removal under a single harvest versus a two-harvest system per season. Mr. Jeke will also use data collected in 2015 to identify the ideal time of harvesting to maximize nutrient removal.

In 2015, Mr. Jeke also conducted an experiment in the secondary cell to determine the effects of flooding on phosphorus release to the flood water and to the pore water within the biosolids layer (Figures 1 and 2). This experiment consisted of intact, cattail vegetated biosolid cores (45 cm diameter x 60 cm high) that were extracted from the dry cell by pushing PVC pipes into the biosolids layer and excavating them with a backhoe. The core assemblies were sealed at the bottom and set up in the cell. Three flooding depths (5, 15, and 25 cm) were tested over a period of 42 days. In-house testing of flood water and pore water samples is nearly complete, while sludge samples have been shipped to a commercial lab for analysis. All samples will be analyzed for different forms of phosphorus to determine the risk of phosphorus mobilization in the event of flooding.

Partial licence removal on Environmental Act Licence #2712

The Town of Niverville, the University of Manitoba, and Native Plant Solutions (NPS) met with representatives from the Province on February 18 and June 23 to discuss the steps needed to decommission the dry cell and remove this area from Environment Act Licence #2712. Based on these consultations the required data was collected and NPS drafted a request for partial licence

removal for the dry cell. The request outlined the work conducted to date and the Project's research findings which provided evidence that the dry cell demonstrates a low risk to human and environmental health and should be considered decommissioned (Table 1). The request for partial licence removal was submitted to the Province October 27.

Upon reviewing the request the Province agreed that the current site conditions, in conjunction with the site's risk mitigation strategy, warranted the removal of the licence from the dry cell. The Province removed the dry cell from the Environment Act Licence on December 29, 2015. This will allow the Town of Niverville to continue pursuing its progressive and sustainable vision for the Niverville Lagoon site as an interpretive and educational park site.

Niverville Lagoon Site Plan

NPS developed a site plan for the transformation of the Niverville Lagoon Bioremediation Project into a recreational area for the residents of the Town of Niverville to enjoy. The site plan has been based on consultation with key stakeholders, including the Town of Niverville, and has been designed to fit into the master site plan for Hespeler Park. The Bioremediation site plan divides the former lagoon site into five areas designed to increase the site's public use and wildlife habitat values (Figure 3). The site plan was submitted to the Town of Niverville August 24, 2015 for their review.

Communication Activities

In 2015, the Project received excellent exposure within the scientific and conservation communities as well as in the local press. In June, the Niverville site was a field trip destination for participants of the Canadian Land Reclamation and Soil Science, and Manitoba Soil Science Society annual conference (Figure 4). Those visiting the site included land reclamation specialists and soil scientists from across Canada. The Project received more national exposure as it was featured in the Spring 2015 issues of the *Canadian Reclamation Magazine* and the *Conservator*, the national magazine of Ducks Unlimited Canada. The Ducks magazine has a distribution of 44,350 English and 2,911 French readers. The project was also highlighted in Ducks Unlimited Canada's 2015 Annual Report. In addition, two research articles on the bioremediation of Niverville biosolids were published in the September and November 2015 issues of the *Journal of Environmental Quality.* Two more articles have been submitted for publication in upcoming issues of the *International Journal of Phytoremediation*. Further Project exposure in 2015 included Mr. Jeke's presentation on the effects of flooding on nutrient loss from biosolids presented at the 2015 joint annual conference of The American Society of Agronomy, The Crop Science Society of America, and The Soil Science Society of America held in Minneapolis, MN. The Project was also featured in the local media as it appeared in an April 16, 2015 story by Steinbach Online.

Funding

Niverville continued to receive additional funds for site commissioning and research support in 2015 from Environment Canada's Lake Winnipeg Basin Stewardship Fund (LWBSF). LWBSF financial support will continue until March 31, 2016. The Town of Niverville has applied for additional funding through Environment Canada's National Wetland Conservation Fund. Successful applicants for this fund will be announced May 2016.

The Town of Niverville and the project partners hope to explore with Manitoba Conservation potential opportunities for site enhancement and interpretation, as well as next step for research and monitoring.

Activities Planned for 2016

In the spring of 2016, as per Provincial conditions, a 1.8 m fence will be constructed around areas still under the Environmental Licence (i.e. wetland cell, holding cell, control cell) while a 1.2 m fence will be maintained around the perimeter of the entire site (Figure 5).

Now that the dry cell area is off licence efforts will begin to transform this area into a public use space. In 2016 this is likely to include earthworks required for the development of footpaths through the site.

Native Plant Solutions and the University of Manitoba will continue to work with the Town of Niverville on the decommissioning of the cells still under licence and on research activities. Wetland plant growth will continue to be monitored in 2016 and any additional activities for commissioning will be carried out.

If you have questions regarding project activities in 2015 please do not hesitate to contact:

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Figure 1. Project Partners (the Town of Niverville and the University of Manitoba) work together to install experimental units for the flooding experiment. Summer 2015.

Figure 2. Mr. Jeke monitoring the flooding experiment in the dry cell. Summer 2015.

Table 1. Decommissioned status of the dry cell.

Dry cell variable	Decommission target	Dry cell status
Biosolid fecal coliform	US-EPA Class B Biosolid target:	Decommissioned: - Dry cell biosolids meet the target level.
Trace elements in biosolids	CCME Soil Guidelines and US EPA EQ and PC Limits:	Decommissioned: - Dry cell biosolids meet target levels for all trace elements.
Nutrient concentrations in surface runoff	Manitoba Tier I Water Quality Standards	Decommissioned: - Nutrient concentrations in dry cell micro-pools meet target levels.
Bioavailability of biosolid nutrients	Low bioavailability of biosolid nutrients.	Decommissioned: - Low bioavailability of nutrients due to low mineralization and high fixation of nutrients in dry cell biosolids.
Public access to biosolids	US- EPA Part 503 Biosolids Rule: - Restrict public access for one year after biosolid application.	Decommissioned - Dry cell has had restricted public access since its development and has been heavily vegetated for 5 years.
Surface water retention in dry cell	Demonstrate ability of dry cell to retain surface water after normal rain events.	Decommissioned - Dry cell micro-pools and vegetated soil provide large water storage capacity.

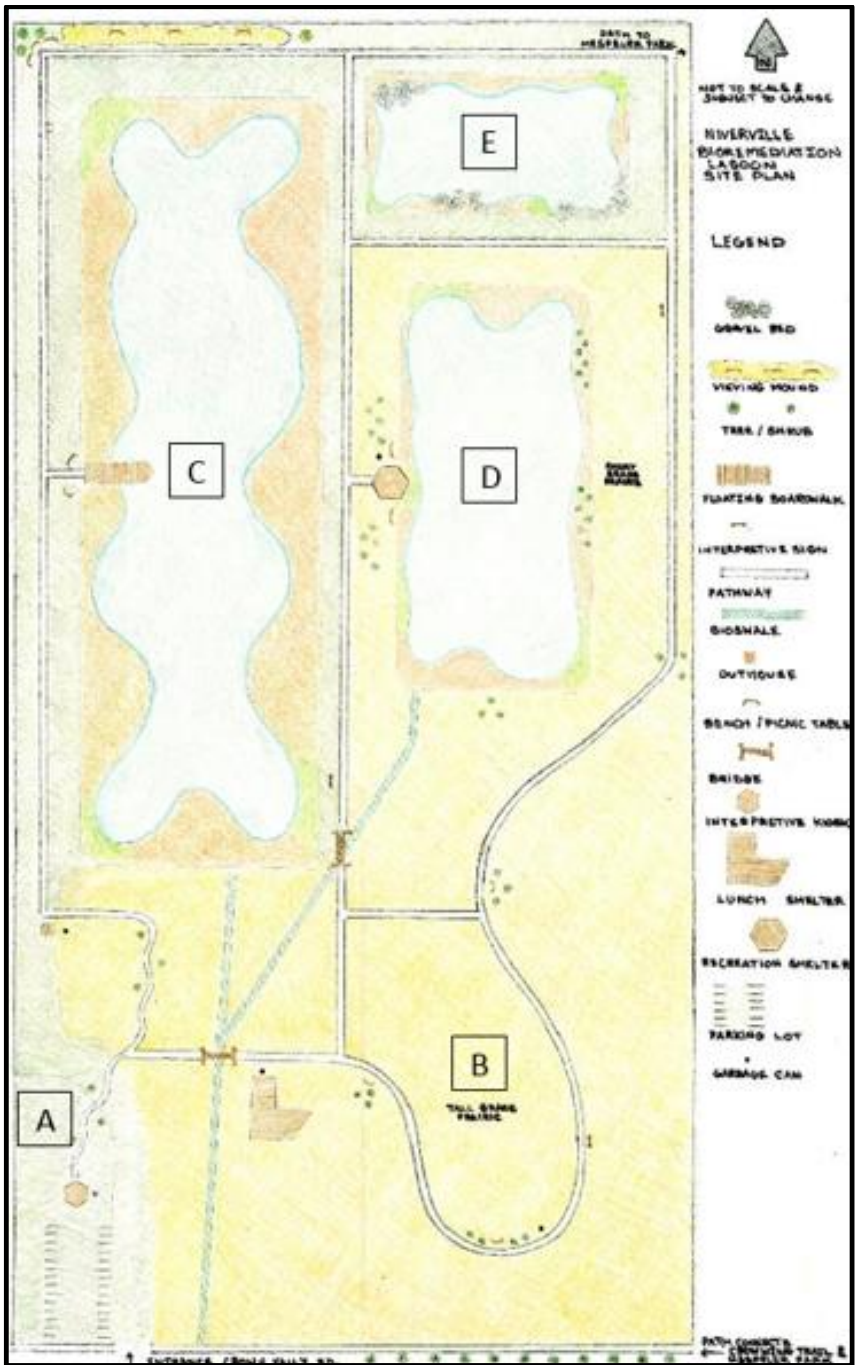

Figure 3. Draft site plan drawing of Niverville Lagoon Bioremediation Project, as a community park and interpretive site. Letters indicate five proposed site areas. The Entrance (Area A), Prairie Vista (Area B), Constructed Wetland and viewing mound (Area C), Recreation Site (Area D) and Habitat Corner (Area E).

Figure 4. Mr. Jeke presenting to the Canadian Land Reclamation and Manitoba Soil Science Society tour at the Niverville site. June 2015.

Figure 5. Proposed 1.2 m fencing location around perimeter of old lagoon site (light-blue, dashed line) and proposed 1.8 m fencing on the inside of the lagoon berms around areas remaining under licence (i.e., control, holding, and wetland cells). Note that the fencing locations shown are approximate and for discussion purposes only. Image courtesy of Google Earth (Imagery date: 2013).