

**Niverville Lagoon – Decommissioning Project  
Environmental Act License No. 2712**

***Report on 2016 Activities***

**Prepared by Native Plant Solutions, January 2017**



This annual 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, as required by the conditions for decommissioning under Environment Act License No. 2712.

***Graduate Student Research***

In 2016, Nicholson Jeke (PhD student at the University of Manitoba) sampled cattail biomass, water, and biosolids in the wetland cell and the dry cell as part of the continued monitoring of the cells to evaluate biomass yield and nutrient accumulation when cattail was harvested once or twice per season (Figures 1-3). This data will be used to evaluate the sustainability of harvesting cattail once or twice per season and the phytoextraction of nutrients. Nicholson also harvested aboveground and belowground biomass of cattail during spring, summer and fall to compare phytoextraction potential between a summer harvest vs. fall or spring harvest. These results will be used to estimate phytoremediation timeframes and will indicate whether it is beneficial to harvest during fall or spring where ecological impacts are minimized as compared to the summer harvest.

A visiting researcher from China, Dr. Xiaofeng Wang, working with Dr. Francis Zvomuya at the University of Manitoba conducted a flooding experiment using biosolids from the dry cell. Dr. Wang's greenhouse experiment examined the release of P when biosolids vegetated with cattail were subjected to repeated flooding cycles at different plant growth stages. Dr. Wang compared P release when the floodwater in the flooded biosolids was either pumped out, to simulate release of floodwater from the lagoon, or left to dry down before re-flooding. Two undergraduate students from the University of Manitoba, Karen Ferguson and Morgan Hope, conducted experiments using biosolids from the wetland and dry cell in fulfilment of their fourth year project requirements. Karen's study examined the effect of repeated flooding on P release from biosolids from the dry cell and compared P release in the presence or absence of switchgrass. Morgan investigated P release under continuous flooding to simulate the wetland cell in the presence or absence of cattail.

### ***Partial licence removal on Environmental Act Licence #2712***

In response to Condition #3 provided for decommissioning under Environment Act License No. 2712 and the changes made with the licence removal on the former dry cell:

*“As indicated, a fence around the site of the control, holding and wetland cells as identified on Figure 1 of the attachment [see Figure 4 in this annual report] to limit access must be installed and maintained. The fence shall be a minimum of 1.8 metres high, be effective at minimizing access to these cells to the satisfaction of the assigned Environment Officer and have a locking gate which shall be locked at all times except to allow temporary access to these cells.”*

a fence was installed in summer 2016, as per the conditions listed above (Figure 4, 5).

### ***Communication Activities***

In 2016, Nicholson published three peer-reviewed papers (Jeke, Zvomuya and Ross 2016a; Jeke, Zvomuya and Ross 2016b; Jeke, Hassan and Zvomuya 2017), as well as presented his research at the 2016 Manitoba Soil Science Society meeting in Winnipeg in February. A site tour was also given to the Ducks Unlimited Canada Board of Directors in June 2016. A second article in fall 2016 was published in Canadian Reclamation magazine on the Niverville project, focusing on the University of Manitoba research.

### ***Niverville Lagoon Site Plan***

With licence removal from the decommissioned former dry cell, the Town of Niverville is now proceeding with preliminary steps to develop the former lagoon into an area that the residents of Niverville can enjoy. In fall 2016, the Town commenced with removal of the eastern berm along the dry cell, to improve sight lines to this area. In addition, construction commenced to create a viewing mound to the wetland along the south side of the holding cell, in the footprint of the dry cell; however, due to poor weather conditions in the fall of 2016, these activities were not completed in 2016. An interpretive shelter was constructed by high school students from Steinbach, and has been temporarily installed within the locked gate of the outer fence (Figure 6). The long-term plan is to relocate this shelter to the eastern side of the lagoon, for public use.

### ***Funding***

Funding the Town of Niverville was receiving from Environment Canada's Lake Winnipeg Basin Stewardship Fund (LWBSF) concluded March 31, 2016. The LWBSF has provided funds for site commissioning and research support since June 2013.

The Town of Niverville continues to explore other funding opportunities to provide support for the wetland bioremediation research and site development as an interpretive area. In December 2016, the Town of Niverville applied for funding through Environment Canada's National Wetland Conservation Fund and the Lake Winnipeg Foundation. Successful applications for both of these funds will be announced in early 2017.

### ***Activities Planned for 2016***

The Town of Niverville, Native Plant Solutions and The University of Manitoba plan on arranging a meeting with representatives from the Province in 2017, to provide an update on research progress made since dry cell decommissioning in December 2015. This discussion will help to support the goal of full site decommissioning, by engaging Provincial representatives as part of the discussion to ensure decommissioning targets are met.

In 2017, Nicholson will continue sampling cattail biomass, biosolids and water in the wetland and dry cell. In addition, biosolids and water samples will be collected in the wetland cell once a month and a sequential fractionation experiment will be conducted to determine temporal changes in phosphorus fractionation in the biosolids and water column. A laboratory analysis of biosolids samples stored since 2011 will be performed to examine the temporal changes in P forms.

Finally, the Town of Niverville will continue site development on the dry cell area no longer under Environmental Licence. Plans for 2017, pending funding availability and appropriate site conditions, include completion of berm removal around the dry cell and preparation of the dry cell footprint for native grass installation.

If you have questions regarding project activities in 2016 please do not hesitate to contact:

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### ***References***

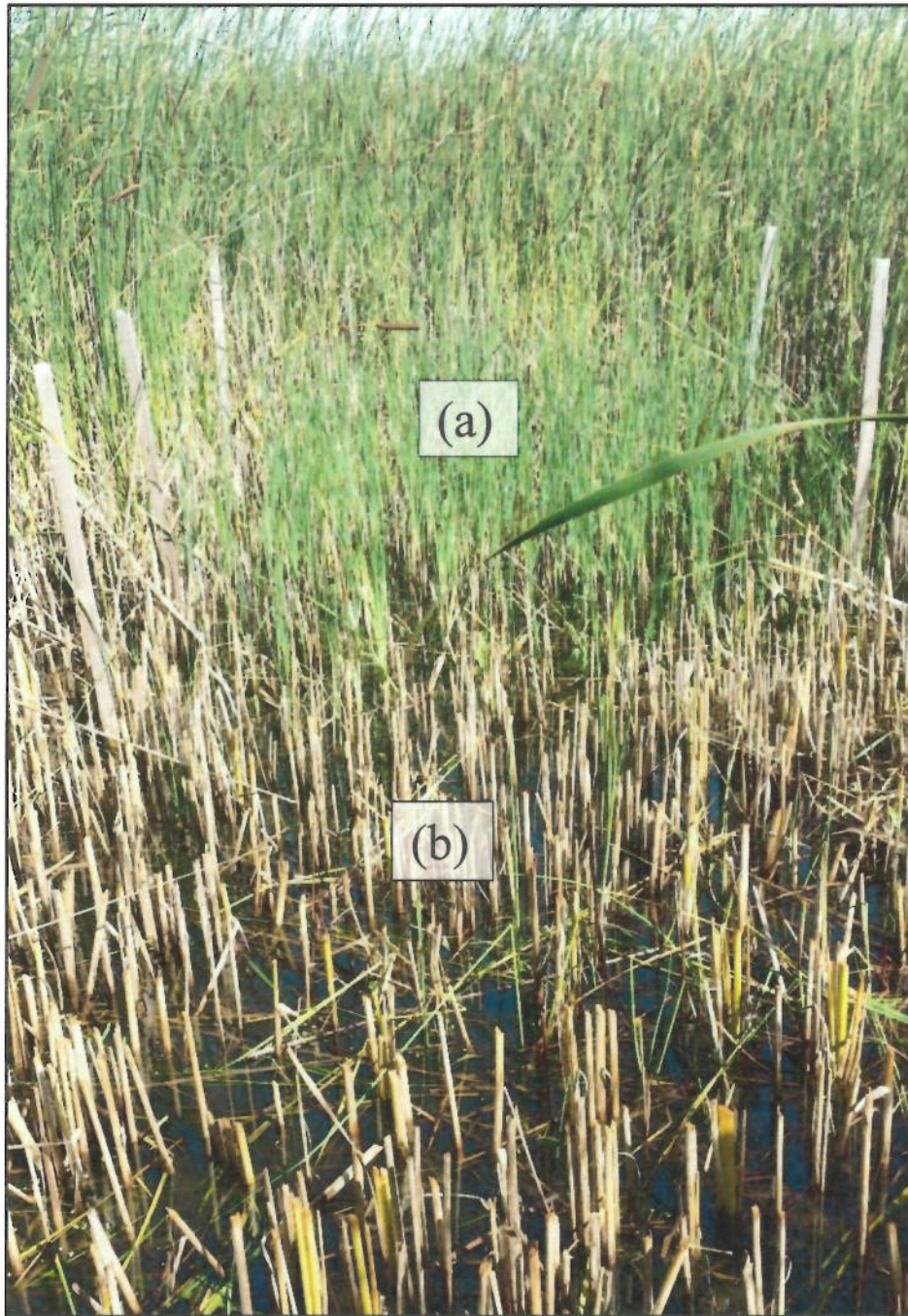
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**Figure 1.** Regrowth in a plot for single harvest per season after 4 years of harvesting (Photo courtesy of N. Jeke).



**Figure 2.** Sampling in the wetland control cell.



**Figure 3.** Harvested plots in the secondary cell: (a) regrowth from a first harvest (July harvest) in a 2 harvest per season plot; and (b) a one harvest per season plot (Photo courtesy of N. Jeke).



**Figure 4.** Outer 1.2 m fencing location around perimeter of old lagoon site (light-blue, dashed line) and inner 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).



**Figure 5.** Installed inner 1.8 m fencing on the inside of the lagoon berms around areas remaining under licence (i.e., control, holding, and wetland cells), as per Condition #3 under Environment Act License No. 2712.



**Figure 6.** Interpretive shelter for the Niverville Lagoon Bioremediation Project, constructed in 2016.