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A CARBON EMISSION
REDUCTION CREDIT PROJECT
PLAN
FOR ECOSYSTEM RESTORATION
ACTIVITIES IN THE BURNS BOG
ECOLOGICAL CONSERVANCY
AREA
(Summary and guidelines)

Prepared for:

Metro Vancouver Regional
District

Contact: Clive Welham

3GREENTREE ECOSYSTEM SERVICES LTD.
24-3871 River Road West
Delta, BC Canada V4K 3N2

clive.welham@3greentree.com



Summary

Background

Burns Bog Ecological Conservation Area (BBECA) is part of a unique raised bog ecosystem, and one of the world's largest protected natural areas in an urban landscape. It was designated in March 2004 when four levels of government came together to purchase approximately 2,042 ha of land that covers about two thirds of the original area of the bog. It is protected by a Conservation Covenant under Section 219 of the BC Land Title Act.

In 2015 a study was undertaken by 3GreenTree to develop a framework for a "Carbon Emission Reduction Project Plan" on the BBECA; in other words, to provide an understanding of the actions needed to quantify potential emission reductions credits derived through carbon sequestration. The project plan was expected to be in alignment with the procedures outlined in the Green Communities Committee's (GCC) *Becoming Carbon Neutral Guidebook*. The Guidebook outlines the requirements for project plan development and validation for two project options, 1 and 2. Option 1 projects refer to: 1. Energy efficient building retrofits and fuel switching; 2. Solar thermal (hot water heating) retrofits; 3. Household organic waste composting; 4. Low-emission vehicles (e.g., for public transportation, police departments and airports); and 5. Avoided forest conversion. None of these project types applies to the BBECA carbon project and so it qualifies as an option 2 project.

In an earlier project by 3GreenTree, an internationally recognized methodology for generating carbon credits related to re-wetting of temperate peat bogs was evaluated for its suitability with activities to restore BBECA. Developed under the Verified Carbon Standard (VCS), this methodology (VM0036) was formally approved in July, 2017 and became publically available in August, 2017. The 3GreenTree study found that a carbon project for BBECA is plausible, there were no major impediments that would materially affect the successful development of a project, and that the VM0036 methodology could serve as the basis for a project specifically tailored to BBECA.

Development of a Carbon Emission reduction Credit Project Plan

In 2017, further work was undertaken by 3GreenTree to develop a carbon emission reduction credit project plan (a major component of which would be "Project Design Document"; PDD) related to the management and restoration of BBECA. The purpose of the PDD is to form the basis of the plan, and as such, be ready for a third party to review and validate. The resulting carbon credits from such a project could then be utilized to help Metro Vancouver and the City of Delta offset yearly corporate emissions. Unexpected challenges were encountered during the development of the project plan, however. In particular, a more in-depth analysis was required of the input data used to support key carbon calculations before a draft of the PDD could be completed that would be suitable for third-party validation and verification.

The scope of the work undertaken in 2018 is, as follows:

- A. Complete a thorough hydrological analysis, and employ the Greenhouse gas Emission Site Type (GEST) approach outlined in the VM0036 methodology to account for greenhouse gas fluxes.
- B. Finalize a carbon emission reduction credit project plan for the planned bog restoration project. The Project Plan will be suitable for review and validation, and include all necessary elements related to additionality, ownership, baseline quantification, monitoring, etc., for a project that describes the restoration activities underway or proposed for the BBECA. The project plan will be in alignment with the procedures outlined in the *GCC Becoming Carbon Neutral Guidebook*. The Guidebook outlines the requirements for project plan development and validation for “Option 2 Projects”.

This work was used to generate a final version of the PDD, entitled “A CARBON EMISSION REDUCTION CREDIT PROJECT PLAN FOR ECOSYSTEM RESTORATION ACTIVITIES IN THE BURNS BOG ECOLOGICAL CONSERVANCY AREA”. This is a revised PDD, that takes account of input received from the project validation/verification process.

Results

Net GHG emission reductions (NER_{RDP}) associated the project activity are calculated as:

$$NER_{RDP} = GHG_{BSL} - GHG_{WPS} + Fire\ Reduction\ Premium - GHG_{LK}$$

where,

GHG_{BSL} = GHG emissions under the baseline scenario

GHG_{WPS} = GHG emissions from the implementing project activities

Fire Reduction Premium = a benefit associated with fire emission reductions as a result of rewetting

GHG_{LK} = GHG emissions due to leakage.

A proportion, $Bufferw_t$, is then subtracted from NER_{RDP} to account for unplanned reversals. This yields the annual project carbon benefits, CB_t :

| Year | NER_{RDP} (tCO ₂ e) | $Bufferw_t$ (tCO ₂ e) | CB_t (tCO ₂ e) |
|--------------------------|-------------------------------------|-------------------------------------|--------------------------------|
| 2008 | 12,202 | 1,220 | 10,982 |
| 2009 | 5,638 | 564 | 5,074 |
| 2010 | 14,986 | 1,499 | 13,487 |
| 2011 | 15,840 | 1,584 | 14,256 |
| 2012 | 14,840 | 1,484 | 13,356 |
| 2013 | 15,387 | 1,539 | 13,848 |
| 2014 | 14,673 | 1,467 | 13,206 |
| 2015 | 12,304 | 1,230 | 11,074 |
| 2016 | 9,094 | 909 | 8,185 |
| Total | 114,964 | 11,496 | 103,468 |
| Total (2012-2016) | 66,299 | 6,630 | 59,669 |

The final carbon benefit is the actual number of credits that can be claimed by the project, as listed in the above table (CB_t; tCO₂e). Note that, as per GCC guidelines, only CBs generated in year 2012 and onwards are eligible for credit; the total for the 2012-2016 period (Total (2012-2016)) is thus, 59,669 tCO₂e. Note that credits do not need to be used immediately or in their entirety, and thus can be 'banked' for subsequent use. Metro Vancouver can therefore adjust credit allocation annually depending on current and future needs.

Guidelines

The audit process

Third-party auditing is a requirement for Option 2 projects under the GCC Carbon Neutral framework. Hence, the first step in project implementation is to engage an auditor to validate activities and verify the CB projections. Validation and verification are mutually exclusive, though to save time and expense, they can occur simultaneously (i.e., as part of the same audit exercise). The Carbon Neutral Guidebook provides guidelines and templates on the audit process and auditor selection. The templates are general and flexible, which may be problematic since they provide little guidance as to what is considered acceptable procedure. Given the uniqueness of the BBECA carbon project, it will be important to provide a contextual framework for the audit process in terms of objectives and expectations. Ideally, auditors should possess one, or more, of the following: (a) Reside within BC; (b) Are familiar with the GCC program; (c) Have experience with the Verified Carbon Standard (since the project is based on a VCS methodology); and (d) Possess a working knowledge of bog ecology. These features can be articulated within the Terms of Reference for the audit contract. 3GreenTree can provide assistance in developing this document and also in navigating the audit process.

A key consideration for Metro Vancouver is the extent to which the audit process is governed by the requirements of the GCC versus the VCS standard, given that the project methodology is based on the latter program. The VCS approach has explicit procedures and practices that add considerable rigor to the audit process and how the credits are derived from project activities. One example is the application of a *de minimis* rule, whereby changes in carbon stocks of less than 5% are considered to be not of material significance, and thus can be ignored. The GCC has no such stipulation. Another, more important, example is a mandatory contribution to a common buffer pool (CBP). The VCS Program addresses the non-permanence risk associated with Agriculture Forestry and Other Land Use (AFOLU) project activities by requiring projects to set aside non-tradable buffer credits to cover unplanned reversals in carbon stocks (due to fire, storms, illegal activities, etc.). The buffer credits from all projects are held in a single AFOLU pooled buffer account (the CBP), which can be drawn upon in the event of a reversal in carbon stocks in any individual project. After applying the VCS risk assessment tool¹, the Burns bog CBP

¹ Verified Carbon Standard. Agriculture Forestry and Other Land Use (AFOLU) Project Risk tool. VCS Version 3 Procedural Document 19 October 2016, v3.3.

contribution was estimated at 10%. Hence, a decision by the project proponents is whether a CBP contribution is indeed necessary, given that the project will not be registered with the VCS. One option then is to omit the 10% contribution. This will enhance the project credit pool but any unplanned reversals would need to be accounted for directly by readjusting the carbon balance. This could result in multiple years when net GHG emissions are negative (i.e., the project was a net emitter) and so no credits would be generated. Another option is to utilize the CBP for its intended purpose as a hedge against unplanned carbon reversals and manage the VCS contribution and release rules internally. This approach serves to smooth out the impact of unplanned reversals, and demonstrates a commitment to ensuring the veracity of the carbon credits.

Under VCS, projects are required to verify all emission reductions such that new credits can be claimed only for the interval between the previous verification event (termed *ex poste* crediting). The GCC approach, in contrast, appears to require only a single verification event at the project outset; i.e., there is no mandatory schedule for verifications. Presumably, the project proponents (i.e., Metro Vancouver) will initiate verification audits on a regular (to be defined) schedule along with procedures for unplanned losses.

Monitoring

The main objective of monitoring is to reliably quantify carbon stocks and GHG emissions in the project scenario for the duration of the project crediting period, prior to each verification, with the following main tasks:

- Monitoring of project carbon stock changes and GHG emissions
- Estimation of ex-post total net carbon stock changes and greenhouse gas emissions, and GHG emissions reductions

Ongoing monitoring is the primary operational task for the project and, as such, Metro Vancouver and the City of Delta will be the principal agents responsible for its implementation. The project proponents will undertake and document the location of the vegetation strata on the property prior to each verification event, with an aim to documenting any change in the plant communities over the period since the last verification event. This will be undertaken using orthophotos covering the entire property, in combination with individual ground observations and measurements from permanent sample plots (section 9.3.3 of the PDD provides details). Unplanned disturbance events will also need to be mapped, using data collected from field measurements, or helicopter or other remote sensing methods, and/or ground-based GPS. Information will need to be compliant with a set of standard operating procedures for data collection and handling.

In the initial reporting period (2008-2016), GHG balances were calculated using only water table depth (i.e., the mapped vegetation types were not utilized to predict GHG fluxes). This is a costly and time-consuming approach because it requires that monitoring equipment be installed throughout the bog, properly maintained and repaired, and data collected regularly. As articulated in VM0036, however, GHG emissions from drained peat, litter and ground vegetation can be more easily estimated based on the presence of Greenhouse Gas Emission

Site Types (GESTs) using calibrated GHG emission profiles from defined vegetation strata. Transitioning to a GEST approach to estimate GHG balances should be undertaken by Metro Vancouver. The steps required to establish the GEST approach are detailed in section 9.3.2 of the PDD. This will require a re-evaluation of the vegetation map established as part of the ecosystem review conducted by Hebda et al (2000)² and the establishment of a field plot network for ongoing monitoring. The 9-year time series (2008-2016) of data showing mean annual depth to water table associated with each of the existing vegetation communities will provide a solid foundation to establish the vegetation-based approach.

Recommended actions:

1. Consider updating the current vegetation strata map with new LiDAR data and/or orthophotos of the bog.
2. Establish a network of vegetation plots to verify the vegetation map and as a basis for future monitoring.
3. Develop a monitoring schedule in accordance with anticipated verification events.
4. Ensure all activities are governed by standard operating procedures.
5. Develop quality assurance/control procedures and personnel accountability with respect to data repository and management.
6. Develop a monitoring plan that encompasses all PDD elements.

² Hebda, R.J., K. Gustavson, K. Golinski and A.M. Calder, 2000. *Burns Bog Ecosystem Review Synthesis Report for Burns Bog, Fraser River Delta, South-western British Columbia, Canada*. Environmental Assessment Office, Victoria, BC.