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Re: Assessment related to Forest Carbon project feasibility

1 Introduction

KPMG LLP was retained to review the forest carbon feasibility assessment completed by 3GreenTree Ecosystem Services Ltd. (the "Assessment") on the establishment of a forest carbon project on the Corporation of the District of North Cowichan's lands. The purpose of the review was to provide a high-level analysis of the project feasibility assessment with a focus on timber revenue assumptions. The report identifies observations of key gaps and provides recommendations for moving forward with subsequent analyses which will explore the benefits and trade-offs of a potential forest carbon project.

This memo describes our observations and recommendations, concluding with a short summary of recommendations/future considerations.

1.1 Engagement Team

The following engagement team performed the investigation:

Shawn Ellsworth, MBA, RPF, EMS(LA), OHS(LA) – Engagement Partner

Shawn is a Partner with KPMG's Forestry and ESG practice in Vancouver, BC. Shawn holds a bachelor's degree in Forestry, a MBA and is a Registered Professional Forester (BC). Shawn is recognized as an expert in the evaluation of forest industry practices (e.g., forest management, operations, and manufacturing) including strategic and operational planning, forest carbon, benchmarking studies, operations and manufacturing management, wood procurement and supply chains. Shawn specializes in helping clients in the Forest and other natural resource sectors in managing risk, ESG strategy (carbon, net-zero, benchmarking, and supply chain), timberland reasonableness opinions and systems and product certification. Shawn has over 25 years of professional service experience, including 16 years of management consulting experience.

Shawn was responsible for overall engagement quality and will be involved in all aspects of the deliverables.

Mike Buell RPF (BC) – Engagement Manager

Mike is a manager in KPMG's Forestry practice with broad estate modelling and carbon modelling experience in the forestry sector and has supported the development of successful forest carbon offset projects for clients. Mike is actively engaged in the development of methodologies and economic pre-assessments for improved forest management projects.

Sam Gildiner RPF (ON) – Senior Consultant

Sam is a consultant in KPMG's Forestry practice with forest management experience and is actively engaged in forest certification and forest carbon projects.

2 Summary of Documents Provided and Reviewed

The engagement team reviewed the documents provided by North Cowichan ("NC") identified in the table below:

Document	**Author(s)/Source**	**Content**
Carbon Presentation June 30, 2020	3GreenTree	Summary of feasibility study and internal carbon offset discussion.
Carbon Feasibility Q & A	3GreenTree	Questions and answers to common questions about key aspects of the feasibility study.
LST for Shaun	3GreenTree	Model outputs in spreadsheet format of baseline and project scenarios.
Feasibility Assessment v2.2	3GreenTree	Assessment to determine: 1. If an MNC forest carbon project would meet the requirements of one or more, internationally recognized standards; 2. If there are any significant risks to project development or operations; and 3. Estimate the carbon credits and financial returns under different potential management scenarios.
Agenda Package – Council – Regular_Oct04_2022	Shaun Mason, Municipal Forester	Report to Council requesting endorsement of UBC Partnership Group Draft Forest Management Scenario Summary and direct staff to proceed with Round 2 of forestry public engagement. This report includes four potential scenarios for forest management and their criteria and indicators.
Appendix B - 2021 Harvest and Profit Summary	Assumed to be Shaun Mason, Municipal Forester	Spreadsheet format of NC forestry financial and harvesting data from 1987 to 2021.
C&I Graphs v1.41	UBC Partnership Group	Spreadsheet format of graphs ranking indicators of the four possible management scenarios.
COW Meeting Minutes July 20, 2019.pdf	Municipality of North Cowichan	Minutes of Committee of the Whole in which UBC Partnership Group presented management

		scenarios and council had the opportunity to ask questions.
Discussion Guide - Round 1_FINAL	Municipality of North Cowichan	Information for public engagement. Information and context for residents to use through the engagement process.
Discussion Guide - Round 2_FINAL	Municipality of North Cowichan	Information for public engagement. Information and context for residents to use through the engagement process.
Indicator results_Sep19	UBC Partnership Group	Calculations for all indicators: carbon, volume, VQOs, old forest, mature connectivity, fire risk, hydrological recovery, trail zone, etc.
Indicator results_Sep27.excel	UBC Partnership Group	Spreadsheet for indicator calculations.
Management Scenario Summary	UBC Partnership Group	Brief description of the four potential forest management scenarios, and their criteria and indicators.
UBC FAC Scenario Analysis Sep 28_2022_for agenda	UBC Partnership Group, 3GreenTree	Presentation of scenario analysis and outcomes.

3 Observations

Observations, identification of key gaps, recommendations/future considerations are described below, arranged by topic.

3.1 Inventory, Growth and Yield

The growth and yield component of FORECAST was calibrated using outputs from both YDYP and TIPSY, resulting in a yield of 365m^3 at 60 years of age. This yield is low for Douglas Fir on a site index of 30. This is possibly because natural disturbance was incorporated in the yield table (see risk section below). Yield tables for Douglas Fir on similar sites, without natural disturbance incorporated, indicate higher yields of 436 cubic meters[1] and 481 cubic meters[2] at year 60. Also, the average harvest from North Cowichan lands was 415 m^3/ha between 2010-2020.

<u>Recommendation/Future Consideration:</u> Complete any future studies using higher yield tables without natural disturbance incorporated, then compare these to VDYP output.

3.2 Timber Pricing and Trends

Timber pricing was set at $90/m^3 in the Assessment, which NC uses conservatively for budgeting purposes. Ideally, if one average price is used, timber pricing should be based on NC's recent price

[1] Timberline Natural Resources Group Ltd. 2007. **Arrowsmith Timber Supply Area. TSR3 Data Package**. Vancouver BC. Page 39 defines analysis units, East-Fir-Medium represents the North Cowichan Forest. Page 59 shows natural stand yields (436m^3 at 60 years old).
[2] Hoover, Coeli M.; Bagdon, Ben; Gagnon, Aaron. 2021. **Standard estimates of forest ecosystem carbon for forest types of the United States.** Gen. Tech. Rep. NRS-202. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 158 p. https://doi.org/10.2737/NRS-GTR-202. Table A20.—Regional estimates of timber volume and carbon stocks for Douglas-fir stands on forest land after clearcut harvest in the Pacific Northwest, West (481 m^3 at 60 years old).

history. Sales data from 2016-2020 show an average of $100/m^3 . Mosaic has demonstrated average Douglas-fir pricing in the $136-167/m^3 range (2018-2022) depending on domestic versus export sales.[3]

The species and product outturns (e.g., species/grade) from the NC and Mosaic landbases will differ but an alternative approach is the use of prices by species/product as opposed to using one average price.

The price trend of 2% for timber is acceptable. Based on professional experience in the Pacific Northwest (BC, WA, OR, CA) and confidential projects, a 2% price trend is not unreasonable for Douglas-fir higher grade sawlogs. Recent studies also support 2% trending.[4]

<u>Recommendation/Future Consideration:</u> Using the NC average of $100/m^3 for timber pricing in the analysis going forward would be considered conservative but pricing scenarios that align with Mosaic price history should be explored. Alternatively, the use of prices by species/product as opposed to using one average price should be explored.

3.3 Cost of Harvesting for Scenario 1

The cost of harvesting was set at $44/m^3 in the Assessment and was based on the NC's average cost from 2016-2020 ($35/m^3), with scenarios exploring a 25% increase due to more recent high demand of contractors and increase in fuel prices. The initial cost assumption of $44/m3 is considered reasonable. Increases in harvest costs over time could be expected due to rising costs in fuel and labour shortages, as well as longer haul times. Based on experience, economic analyses typically include a cost trend similar to price trends (rise by x%/ year) to represent expected rises in costs and studies have shown that costs could rise as much as 25% over 30-40 years.[5]

<u>Recommendation/Future Consideration:</u> NC should consider using cost trends in any future analysis to account for the uncertainty in the cost of future harvesting.

3.4 Forest Carbon Price and Trend

The forest carbon offset pricing (5,10,20 CAD/t with a 1% trend) used in the analysis report would be considered acceptable and conservative given current markets and recent (confidential) contracts that have been reviewed. The pricing (25 CAD/t) used in subsequent analysis and presentations would be considered conservative, but the 5% initial price trend would not be considered conservative.

Presently offset units can generate $8-15 CAD, but this is expected to gradually increase over the coming years as governments work to meet GHG emission reduction targets.[6] In 2019, Canadian forest carbon projects sold for an average of $10.05 CAD.[7] Recently reviewed (confidential) sales contracts put the price of offset in the $25-30 CAD range.

Mark Carney's Taskforce on Scaling Voluntary Carbon Markets is much more optimistic about future carbon prices with estimations of demand for carbon credits increasing up to 15-fold by 2030 and up to

[3] https://www.mosaicforests.com/about-our-business#logexports
[4] http://resource-analysis.com/wp-content/uploads/2020/02/RPA-Forecast-Tool_-JForPolEcon2020.pdf
[5] https://cfs.nrcan.gc.ca/pubwarehouse/pdfs/37783.pdf
[6] https://vancouvereconomic.com/wp-content/uploads/2021/12/2021_Carbon_Offset_Report_WEB.pdf
[7] https://data.ecosystemmarketplace.com/

100-fold by 2050. However, these projections are contingent on retirement of the current surplus of offset units (many of which relate to REDD+ projects). Increasing demand for carbon offset units is expected to be driven by an increase in corporate Net-Zero goals and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).[8]

Based on the above we believe that a price in the range of $20-25 CAD for new projects would be conservative for both voluntary and compliance projects. We also believe a price trend ranging from 2.5% to 5% could be expected given the supply and demand forecasts, but the initial price trend should start in the lower part of this range.

Recommendation: Rationale should be provided to support the assumption of an initial rate of 5% pricing growth. A variable trend could be explored that uses a conservative trend over the short-term rising to the more aggressive trend 5-10 years out in the forecast.

3.5 Scenarios

3.5.1 Status Quo

3.5.1.1 Harvesting Land Base

The timber harvesting land base (THLB) was appropriately defined by exclusion of areas such as riparian buffers, roads, reserve areas, and net-downs for visual quality objectives. However, THLB net-downs did not include removal of uneconomic stands due to the relationship between timber value, harvest system, and haul time. Inclusion of these inoperable areas will make the economic analysis more accurate.

Recommendation/Future Consideration: Uneconomic stands should be removed from the THLB when developing future carbon models where these areas are not subject to future harvest and therefore would not be considered as eligible as a harvest deferral and carbon credit generating areas.

3.5.1.2 Project Start and Harvest Rate

Business as usual is based on continuation of harvesting and silvicultural practices employed by NC over the recent past. Review of the harvest rates between 2010-2020 demonstrate an average harvest of 15,000 m^3/year, while for the years 2010-2019 the average rate was 17,000 m^3/year. The analysis status quo scenario used 17,000 m3/year which is acceptable given that that council suspended harvesting based on demands from community residents during the forest management planning process which started in 2019.

Recommendation/Future Consideration: Ensure NC has a clear rational stating that 2019 is the project start date which is directly linked to the NC Council's direction to stop harvesting until the planning process is completed.

[8] https://data.ecosystemmarketplace.com/

3.5.2 Carbon Scenarios

3.5.2.1 Discounted Cash Flow

The Assessment did not use a discounted cash flow (DCF) for timber or carbon valuation. A DCF excel model could be used to provide net present value estimates of the status quo and carbon scenarios. These models can be developed using NC assumptions on harvest rates, % harvest by species/end-sort, published factors (convert m3 to tonnes carbon), and offset pricing for example.

Recommendation/Future Consideration: NC should consider performing economic modeling and NPV calculations on relevant scenarios to support any future decisions on harvesting versus carbon projects.

3.6 Project Structure

3.6.1 Risk

The Assessment does not clearly state the reductions for natural disturbances. It was noted that reductions for losses were accounted for in the FORECAST growth and yield model but not specified. We also noted percent reductions were made in the excel model but were not justified in the report. This risks double counting and lacks transparency.

Recommendation/Future Consideration: Percentage reductions from natural disturbance should be identified and described outside of the growth and yield model on an annual basis for common disturbance types (e.g., biological agents (insects/disease), windthrow, landslides, and fire).

3.6.2 Uncertainty

The Assessment did not discuss nor document the percent reduction for uncertainty. The analysis relied solely on provincial VRI and modeled data. There are no sample plots in the NC forestlands. Projects relying solely on inventory and modeled data will need to consider using a reduction percentage to account for uncertainty. NC engaged a 3rd party to update the VRI data and assess the overall data set. The results of the assessment were positive, and this assessment could be used in the uncertainty risk calculation.

Recommendation/Future Consideration: Uncertainty risk should be identified outside of modeling.

3.6.3 Leakage

The Assessment used a leakage of 20%, but this may be a high percentage in the context of NC.
Recommendation/Future Consideration: Leakage should be clearly identified in any future modeling and qualified professionals should be consulted to determine appropriate leakage factors.

3.6.4 Forest Carbon Pools

The Assessment does not clearly document the forest carbon pool allocation – the carbon by pools such as above ground, below ground, soil, HWP. Specifically, the net emissions and carbon storage related to harvested wood products and from logging, transportation, and processing of wood products are required in the VM00012 Methodology. This will be a requirement if a project is brought forward for

initial review by standards such as Verra. It will also provide transparency in reporting showing differences in pools amongst the scenarios.

Recommendation/Future Consideration: Pools, including harvested wood products, should be reported individually in analysis reports.

4 Recommendations

The following table breaks down findings based on enhancements that could be made to the current analysis versus recommendations for future analysis.

Analysis Enhancement	**Comments**
The average yield (m^3/ha) appears to be low given yield tables in adjacent lands and NC harvest statistics. The analysis also stated that natural disturbance is incorporated.	Complete an assessment to demonstrate the FORECAST yield tables accurately model the NC forestlands. For example, within 5-10%. The assessment could compare FORECAST yield tables without natural disturbance versus VDYP output.
Timber pricing assumption appears to be low; there is an opportunity to demonstrate alternative markets have been explored.	Re-run the scenarios using NC pricing data supporting \$100/m^3 Alternatively, the use of price by species/product could be explored. Discuss the impact of alternative markets in the final analysis report but state that using a price based on best available data that is representative of NC log brokers and markets was deemed appropriate.
Future harvesting costs may be low and should include forecasted increases.	Use a cost trend to model uncertainty in possible increases in cost.
Carbon value growth increases (5%) were deemed to be high.	An initial starting price of \$20-25 CAD is reasonable. We do recommend using a conservative initial price trend of 2%, with increases to a higher trend in 5-10, years with a transition to 5% 15-20 years into the forecast.
Natural disturbance risk, leakage, and uncertainty reduction percentages should be clearly stated.	State credit reduction percentages explicitly in the final report.
Future Recommendations	**Comments**
Develop a DCF excel model that will provide net present value estimates of the status quo and carbon scenarios.	These models can be developed using NC assumptions on harvest rates, % harvest by species/end-sort, published carbon factors (convert m^3 to tonnes carbon), and offset pricing.

Uneconomic stands were not removed from the THLB, therefore all inoperable areas may not be reflected in the harvesting land base.	Include harvest system and haul time analysis to include uneconomic stands in the THLB net-downs.
Forest carbon pools were not reported in the analysis report.	Report out on all pools in future reporting to clearly demonstrate the tonnes of carbon by individual pools.
Begin seeking partnerships with initiatives such as the BigCoast Forest Climate Initiative or the Province's Forest Carbon Initiative and Climate Change Strategy.	Joining a partnership may reduce project costs and allow for international promotion of a potential project.
Develop a project description document that could be used to elicit letters of intent to purchase offset credits.	Letters of intent can provide price signals that can be communicated back to council.

5 Conclusion

The 3GreenTree analysis and supporting data provides a reasonable and conservative approach to demonstrate the initial potential of a forest carbon project. Our review of the Assessment did not reveal any significant deficiencies or concerns about the Assessment's conclusion of the high-level feasibility of potential carbon projects on the NC forest tenure. As we note above there were several best practice recommendations for NC to consider in any future modeling and decision making related to forest carbon projects. Re-running the scenarios with updated price and cost assumptions should be considered along with refinements to the analysis report.