Validation Report: Sunnyside Elementary School, Fayetteville, North Carolina

General Verification Information	
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Number of verification reports completed	*0*

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Validation Summary

Students from American University (AU) analyzed the Sustainable Sandhills project at Sunny Side Elementary School over the spring and summer semesters of 2018. This project, formally entitled Sustainable Sandhills Community Planting, is an afforestation project in Fayetteville, North Carolina, that will serve the Cumberland County School District as a place for environmental education and will generate carbon credits for two buyers in addition to providing numerous co-benefits. Urban Offsets, in partnership with the Cumberland County School District, planted 911 trees, and AU's surveying sampled 120 of them. This validation report, which is the initial project verification performed by AU, the peer institution, seeks to address this project's compliance with the Duke Carbon Offsets Initiative (DCOI) Urban Forestry Protocol 2.1 in order to utilize generated credits to offset scope 3 emissions. The DCOI Validation Checklist 1.1 was used as a guide to validate this project. The project was analyzed for compliance with the Permanence, Additionality, Verifiability, Enforceability, and Real (PAVER) requirements, and was ultimately validated with recommendations for future improvement.

The verification findings speak highly of the management practices put forth in the Woodland Plan (henceforth The Plan) but warn against deviating from key maintenance provisions. The Plan was reviewed by a forestry graduate student, who recommended edits to the plan based on the planting site. The timeline proposed is satisfactory and the project is ahead of schedule. Errors in the GPS system and verifier error in tracking data account for many of the original uncertainties associated with the validation. The initial uncertainties identified in this report by the verifiers, mostly discussed in the Permanence, Additional, and Verifiable Sections, have been adequately corrected; therefore, the peer validators have validated the offset project.

Eligibility Conditions

The Sustainable Sandhills Project has three sites: The Educational Resource Center, Gallberry Farms Elementary School, and Sunnyside Elementary School. This verification involved a site visit to the Sunnyside Elementary School site. This site is located within an Urban Area, as defined by the most recent publication of the US Census Report. The location's project boundaries are marked in red on the electronic ArcMap GIS map in the Project Description Document or PDD. The project location has not been a site of commercial forestry in at least the past five years. The project has no "end-of-life" use planned for fallen, damaged or management directed tree removals. However, it is stipulated by the Woodland Plan that if more than 15% of trees die, they will be replaced.

The project commencement date normally signifies the early stages of project planning. Ideally, this project's commencement date should be the day of contract signing. However, due to delays in distributing documents amongst actors involved, the contracts were signed after the terms were agreed upon and the trees were planted. Because of these delays, the commencement date is chosen conservatively to be the day of the tree planting: January 12th, 2017. This date is found in the PDD and is supported by the registry, "Educational Resource Center- Sustainable Sandhills Community Planting- Pilot" (https://registry.urbanoffsets.co/project/projectview?projectIdKey=ec0a838f-

d996-4d41-884c-147aa2b0f6bb). The project has been added to the Offset Network Registry because it was submitted to the Urban Offsets Registry and seeks to generate credits through peer verification. The initial project inventory was completed in March 2017 by Sustainable Sandhills.

The calculations, found in the PDD, include the tree counts for all of the Sustainable Sandhills Project locations including Sunnyside Elementary, the Educational Resource Center, and Gallberry Farms Elementary. All reductions and removals are included in the calculations of the project's impact beyond what is required by federal/state/local law, statute, rule, regulation, ordinance, court order, or other legally binding mandates. Sustainable Sandhills and the city of Fayetteville confirmed that there are no legal requirements dictating project-related tree plantings. Additionally, local ordinances in the city of Fayetteville (http://online.encodeplus.com/regs/fayetteville-nc/doc-viewer.aspx#secid-1007) were explored to further confirm that there are no legal requirements for non-development related tree plantings.

The project internally performed a full inventory using the Fulcrum data collection app for tree inventorying. However, upon visiting the Sunnyside Elementary School site, it was clear that the tree locations were not correctly pinned using Fulcrum. This issue was attributed to poor cell service and incompatibility of the app with Android phones. In addition to the Fulcrum app and the raw data files that kept the locations pinned in the app, the full inventory was also done by hand as a hard inventory in order to confirm the data found via Fulcrum. This grid data sheet was provided for use as part of the verification process. In the Site Visit section of this report, this location issue is further discussed. The Plan and the PDD prescribe annual inspection of the planting sites to ensure the health of the trees. Each annual full inventory will be performed by taking a representative sampling of trees and recording the species, DBH, height, estimated age, and GPS coordinates. After the 2018 initial peer verification, there will be peer verification every 5 years. The project will continue for 40 years, from 2017 to 2057.

Permanence

To ensure the project's permanence, the planting conditions and maintenance practices are outlined in the "Woodland Plan" by Craig Gottfried, Cumberland County Ranger for the North Carolina Forest Service. The Plan is species specific for the Longleaf Pine, and includes provisions to protect against Southern Pine Beetles, making it relevant to the ecological region and species planted at the site. The Plan does not include provisions for pruning or water in times of high heat or drought. The Plan does account for root zone protection during the Spring through Fall of the year after the initial planting event. Root zone protection occurs during monthly mowing or bush hogging, and, during walk-throughs to clear weeds. The bush hogging and clearing of weeds occurred in the locations that required it during the spring through fall of the first year, according to Gloria Lengel from Cumberland County Schools. Annual inspections are part of the Plan's provisions for pests and disease. Additionally, the Plan also includes provisions for full replacement of dead trees in the case that over 15% of trees die. However, Gloria Lengel claims that trees will be replaced on an individual basis during annual inspections.

The project risk was appropriately calculated but there were concerns identified after the initial site visit, that a large group of trees had been mowed over. However, these concerns were clarified and

verifiers were informed that trees would be individually replaced; including a replacement of trees that had been mowed over. Therefore, it is confirmed that the appropriate buffer pool contribution is being designated (equivalent to project risk) and is separate from the available project credits. According to the PDD, the project risk is calculated at 15%, which is the standard buffer pool contribution as stated in the DCOI protocol, accounting for natural disasters and non-natural failures. However, under Future Management Considerations in the Woodland Management Plan, tree thinning is suggested after 20-25 years in order to protect against Southern Pine Beetle attacks and to maintain appropriate growth rates, with additional thinning occurring every 5 to 10 years. If this "thinning" referred to cutting down trees to provide space for other trees, the buffer pool would have to be increased to account for the loss of trees to thinning after 20-25 years.

However, according to Ying Wei Jong, a Masters of Forestry Student at Duke University, self-thinning occurs naturally in pine stands as the smaller, weaker trees in the stand die and provide space for remaining tree. Over time, the stand still experiences a net increase in carbon storage as remaining trees grow larger. Compared to one-to-one tree replacement, it is more important to be sure that the planting boundary remains intact rather than focusing on the count of trees in existence. Southern Pine Beetle infestations do not typically occur with longleaf pine, and the stand will not get dense until after 35 years according to simulation using FVS software, a timber and carbon projection software developed by USFS. Therefore, thinning will likely not be required for longleaf pines in the project period, unless future verifications after 20-25 years of planting notice a need. Her full comments, received via email, can be found in the appendix. It is recommended that the Woodland Plan be amended to incorporate this advice.

Additional

This project is not bound by law. Neither the Cumberland County School district, nor the state of North Carolina are bound by law, regulation, statute, or court order to plant trees for this project. There are no relevant required actions to explain. The project operator attested, via signature within the PDD, to the validity of this statement. Sustainable Sandhills has signed an agreement with Urban Offsets that states their maintenance of non-project trees will not suffer nor will their current levels of planting be impacted by the project. There was not adequate information from the past five years to establish a baseline for the urban forest budget, so in lieu of that, a contract was signed with the city of Fayetteville to ensure minimal leakage. Although a contract of this sort assures additionality in local government, we recommend that for future projects, the project manager and operator assemble any budgetary information regarding urban tree planting to demonstrate the budgetary baseline for urban forests. Implementation barriers include inadequate funding and staffing, which prevents expansion of planting programs at Cumberland County Schools and Sustainable Sandhills. Currently, most of the coordination and site management is done by Gloria Lengel, with the occasional help of students and other staff members. Lengel delegates maintenance tasks to custodial staff but maintains these sites alone. These barriers have been addressed in the contract and Sustainable Sandhills will continue to pursue more funding for planting trees. Lengel claimed that funding assistance came from a state grant and that this grant counteracted the previous financial barrier. In a follow up response, Lengel stated that the grant was from the Legacy Tree Fund of the NC Urban Forest Council for $1,000, which was used for all three sites. Although a small grant could not cover the entire project, it may not reduce additionality depending on the

objectives of the grant. However, Leanna Grondy did not know of any grants used upon follow up, so it is uncertain if the amount of funding would have changed because of the grant.

Verifiable

To verify the project impact, the Woodland Plan stipulates that project monitoring occurs at first monthly and then annually following the first year. The first full inventory was completed in March of 2017. The Registry website confirms this information by providing evidence that the initial full inventory occurred in early 2017. According to the PDD, annual monitoring includes information about the species, DBH, height, estimated age, and GPS coordinates. This location's Woodland Plan mentions a future management consideration of "walking over the area at least once a year looking for signs of insect or disease problems." According to Gloria Lengel, she monitors each site at least once per month, and reports to the school system when she notices any issues. The information is relayed to custodial staff and the issues is solved. This process was utilized to put flags around the trees, when mowing accidently damaged trees, to prevent future accidents. The custodial staff regularly maintain the trees. They follow practices guided by the Woodland Plans associated with their school and are given further guidance by Gloria, who relays her advice to them through the school's principal.

It is important to note that future students working on peer validation should acquire monitoring reports and notes in order to discuss project monitoring and sampling techniques and these reports/notes should be maintained. The trees were not properly identified in Fulcrum due to the inaccuracy of the GPS location on the app, so the monitoring tool was unable to be used. The student verifiers did not utilize grid-based data sheets to confirm these locations. According to the PDD, a representative sample is gathered to complete the full inventory, and sampling is appropriate at the Sunnyside Elementary School Site. However, this should be confirmed with monitoring reports.

Enforceable

The contracts clearly define Duke ownership of the credits in the registry project "Educational Resource Center- Sustainable Sandhills Community Planting- Pilot." The ownership of credits, to "Buyer 1" and Duke University, is specified once more on page 16 of the PDD. Offset credits had not yet been generated from the project site at the beginning of the validation process. Originally, it was unclear to the verifiers how the trees that Duke claimed for carbon credits are differentiated from the other trees and other projects. According to Gloria Lengel, there is no way that the 106 Duke trees at Sunnyside Elementary are separated from the total 911 trees. Additionally, the PDD explains that there are different entities claiming credits for each of the three Sustainable Sandhill project sites, so the verifiers first wondered how trees would be marked to avoid double counting. Leanna Grondy, Project Manager for Urban Offsets, clarified that the registration process does include internal numbering of credits, or reference numbers, that help to differentiate these trees.

Real

The estimate of the project's impact is legitimate. Although there was worry that, with a buffer pool of 15%, the estimate may not be conservative, Gloria Lengel claimed that the trees that were accidentally mowed over originally were replaced assuaging the doubts. This replacement has not been observed by the verifiers and we recommend that photo confirmation of these replacements be taken. The species-specific US Forest Service carbon calculator was used to estimate growth rates, making the sources used to estimate growth rates clearly stated. The US Forest Service carbon calculator was the suggested source in the DCOI protocol, which was used for this project's calculations according to the PDD. It is accepted in academia to calculate carbon sequestration. On page 15-16 of the PDD, the calculations and methodologies explaining the calculations are written out. The credits are calculated following the US Forest Service carbon calculator along with tree species, DBH, and height to calculate carbon sequestered. The projected data will be made public after peer validation. The project details are available to the public at: https://registry.urbanoffsets.co/Project/ProjectView?projectIdKey=65d25a7a-c7a4-47d2-ad65-811af27be20f.

To verify these calculations, the calculations on the Loblolly Pine were checked. Using the US Forest Service Carbon Calculator, the species *Pinus taeda*, was selected and the age of 40 was chosen. This calculation was consistent with the finding that the Loblolly Pine would produce 5.5 carbon offsets per tree over 40 years, which was multiplied by the number of trees planted. The Longleaf Pine makes up the rest of the carbon offsets, totaling 5,010 offsets by maturity. The buffer pool, which represents 15% of the total offsets was correctly calculated.

Co-Benefits of Urban Tree Plantings

Co-benefits of the project are reasonably assessed by the project. The PDD claims that the project addresses all five categories of co-benefit; each of these benefits are touched on in this section. The PDD states that the project provides educational opportunities through the peer verification and validation process, being accessible as a living laboratory for universities involved and students in surrounding school districts. Urban Offsets engages socially by involving local volunteer groups in the tree planting process. These urban trees have numerous health and conservation benefits, including the reduction in airborne illness, urban heat island effects, and storm water runoff. Forestry projects benefit economies of scale as the cost to purchase and manage each acre of a forest decreases significantly as more acreage is added. The partnerships between business connections, as well as other universities, are cultivated with this project. During our site visit, we concluded that co-benefits may include environmental education opportunities for the adjacent elementary school, green space for students to play in, and a visually appealing vegetation buffer between a neighborhood and the school.

Interview Questions for Project Participants

In accordance with the suggestions outlined by the Validation Checklist, we interviewed the Urban Tree Planting Owner, the Urban Tree Planting Operator, and the Urban Tree Planting Maintainer. Their contact information, and relevant summaries, are recorded below with more in-depth notes on the interviews found in the Appendix section.

Gloria Thomas Lengel
Green Schools Coordinator
Cumberland County Schools Operator, Sustainable Sandhills
910-678-7046
glorialengel@ccs.k12.nc.us

Gloria Lengel, who represents the Urban Tree Maintainer/Owner, verified that the maintenance plan is being followed and that the issues with mowed over trees has been resolved by replanting. She has been checking on the health of these trees once a month and reporting any issues to the custodians who perform maintenance tasks. There is no need for pruning at this stage and the native species do not require an irrigation plan since they are meant for low moisture upkeep.

Leanna Grondy
Project Manager
Urban Offsets
336-337-0720
leanna@urbanoffsets.co

Leanna Grondy, who represents the Urban Tree Operator as part of Urban Offsets, detailed that no project reversals have been made and that the buffer pool has not been used as of the 20th of June, 2018. She explained that Urban Offsets has a process in place for buffer pool use and replenishing trees in the population. The tree monitoring, in this case, is not done by the Operator but instead by the Maintainer/Owner. This monitoring is explained in correspondence with Gloria Lengel.

Site Visit

A site visit to Sunnyside Elementary School confirmed that there were at least 911 trees planted by the project. Originally, the verifiers were unaware of reference numbers that are internally kept to differentiate the 106 trees claimed for credit and the remaining trees claimed by other entities. During the initial verification, the Fulcrum app was not working properly due to incompatibility with Android and poor cell signal, so the pins for trees were inaccurately placed. A full inventory, following the DCOI Urban Forestry Protocol was conducted by hand and submitted as well. According to Gloria Lengel, Green Schools Coordinator for Cumberland County Schools, improper maintenance led to the loss of some trees during the Southern Pine's grass phase of growth. As a part of the standard maintenance plan, custodians at the school were asked to mow in between trees. However, some trees were so small the custodian thought they were grass so about 15 trees of the

~120 that we surveyed were mowed over. The mowed over trees have remained in the ground and some may recover, however others will likely die or have already died. New replacement trees have been planted next to the mowed over trees. In order to mitigate the risk of trees being mowed over again, trees have been marked with flags.

At the time of our visit, there were weeds encroaching upon root collars. The vigor and maintenance of the trees was not ideal. The trees planted in sandy soil were markedly shorter and in poorer health than the trees planted along the edges with more nutritious soil. Longleaf pine's thrive in sandy soil with medium to strong acidity, so the soil conditions appear to match the native species' normal habitat. Because of the observed trend, we suggest that Urban Offsets and Cumberland County Schools pay close attention to how the soil conditions impacts tree growth over the 40-year project timeline, and adjust carbon offset calculations as necessary. The maintenance plan was not properly executed, as trees in their grass growth phase were mowed over. This problem has been addressed by flagging trees to make them more visible. Dead or dying trees have been replaced. After a follow up discussion with Gloria Lengel, these weeds were cleared shortly after the site visit. There is a mechanism for reporting issues with maintenance, and Lengel checks on their wellbeing often. We recommend that this reporting be supplemented by storage of photos from before and after maintenance reports are filed.

Validation Statement

Through an assessment of project documents, interviews, and a site visit, we were able to verify the carbon credits associated with the Sustainable Sandhills project at Sunnyside Elementary School and identify key areas of improvement. During the site visit, we were able to confirm the presence of 911 trees planted by surveying a sampling of 120 trees. We chose to sample 120 trees because it includes the 106 trees are associated with the Duke carbon credits in their "Educational Resource Center-Sustainable Sandhills Community Planting Pilot" (https://registry.urbanoffsets.co/project/projectview?projectIdKey=ec0a838f-d996-4d41-884c-147aa2b0f6bb). The vigor and maintenance of the trees was not ideal, as detailed in the site visit section of the report. However, much of these maintenance issues have been solved since these errors were discovered and will be accounted for as long as the maintenance plan is followed.

We verified the fulfillment of the PAVER requirements, with the help of experts like Ying Wei Jong (an ISA-certified Arborist) and those interviewed, as well as further examination of some of the resources originally passed along. To ensure permanence, the project should consider adding provisions for watering during times of drought. The project impact estimate was reviewed and accepted. The timing outlined in the PDD, and the events that have already occurred, are accepted by the verifiers. The project will benefit the surrounding community, generating peer verified offsets, as planned.

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Megan Litke
Director of Sustainability Programs, American University

Appendices

1. Email from Ying Wei Jong

Ying Wei Jong Email
6/8/2018

"The longleaf pine plantings at Sunny Side deviates from other existing urban tree planting projects in the sense that the planting and management method resembles that of pine plantation in forestry. Because of this, a woodland management plan will be more applicable to this tract compared to the usual arboriculture management schemes outlined in the Urban Forestry Protocol. Under a woodland management plan, it will not be necessary to carry out deceased tree replacement because forest stands naturally self-thin when larger trees outgrow smaller trees due to light competition. Trees that die give space for remaining trees to achieve larger size. As a forest matures, it typically goes from having numerous small trees to having fewer large trees. Under such conditions, instead of calculating the number of individual trees and verifying their GPS locations, the annual survey might focus more on making sure the planting boundary is intact, and the longleaf pine seedlings are protected and not competing with weeds, because longleaf pine seedlings tend to stay small for a long time before undergoing a growth surge. That being said, it will probably still be recommended

to plant back seedlings that were damaged by the mower previously, as the mower likely created a gap in the planting site.

The Sunny Side woodland management plan also recommended thinning to prevent southern pine beetle (SPB) infestation. While SPBs are known to attack loblolly pine, they don't typically attack longleaf pine, and from our Forest Vegetation simulations, the stand will not get dense until after 35 years. Therefore, there will likely be no thinning required for the longleaf pines planted at 20-25 years unless a verification event in future illustrated the stand is in desperate need of thinning. For longleaf pine stand verification, the verifiers are recommended to engage assistance from a forester (instead of arborist)."

2. Email from Leanna Grondy

Responses in Leanna Grondy Email
6/20/2018 at 2:52 PM

1. Have there been project reversals identified?
- None that Urban Offsets has been made aware of.

2. Has the project needed to utilize the carbon offsets buffer pool?
- Not as of June 20th, 2018.

3. If this buffer pool needs to be accessed, what steps will the organization take regarding the associated accounting changes?
- Urban Offsets would need to quantify the amount and verify the buffer covers this amount. Next, we would issue an amendment to the agreements established between both the VERU's purchaser and the tree supplier. Then we would adjust our inventory and associated credit numbers. Finally, we would issue documents to the purchasers for their records i.e. credit letter, certificates and signed contract amendments. Following these steps, Urban Offsets would need to determine if the buffer pool would need to be replenished through new tree plantings.

4. Do you assess if tree monitoring follows the DCOI Urban Forestry Protocol?
- No, that's not our role.

5. Can you describe your tree sampling methods?
- Tree sampling methodology is outlined in the DCOI protocol.

3. Notes from Interview with Gloria Lengel

Phone Interview with Gloria Lengel
7/5/2018 at 11:30 AM

1. *What barriers (financial, political, social, etc) lead to the current business-as-usual tree planting levels?*
- Most community was unaware of what carbon banking was/how it works.
- No true political barriers. The idea was presented to the principals at each school and they relayed the ideas to the maintenance teams once they were onboard. Most of the principals were happy with the idea.
- A major barrier was funding before grant from the state was received.

2. To whom do offset credits generate through the project?
- Cumberland County Schools and others can purchase the credits.

3. To your knowledge have these credits already been retired?
- I'm unsure about who has purchased the credits and if they have been retired.

4. Is there a tree pruning plan (or regularly scheduled tree pruning)?
- The trees are small and do not need to be pruned yet.

5. Is there a maintenance plan or specific management in practice to care for young trees?
- Yes, there is a maintenance plan in place. There have been issues with custodians mowing over the trees. There are now flags up to mark each tree at some sites and to mark boundary lines for rows of trees. The trees that were mowed over were replaced, as they are once a year as needed.

6. Is there an irrigation plan tailored for new trees?
- There is no irrigation plan tailored for new trees because they are natives that rely on low moisture levels. An irrigation system is unnecessary for this project.

7. How often does a member of the urban tree planting team assess the health of the trees? Is this data recorded?
- I do a walk through to assess their health often- usually at least once a month. I do not keep note of this data but report any issues with plant health immediately to the custodians.

8. If the site maintenance team identifies a tree as deceased, what steps are taken?
- These trees would be replaced at the time of the next annual count.

9. How are tree issues reported? How might the public report an issue with a tree?
- Tree issues are reported through reporting to the school system. They will inform the maintenance team this way.

4. Urban Offsets' Shawn Gagne's comments on the validation report

Overall peer verification structural comments:
Reports could use a section at the beginning that identifies all names mentioned in the report along with their organization and title.
Reports could use a summary table of actions at the end of each report. The table could include items that should be reviewed/fixed before next verification and items that should be checked at next verification. For example, items that keep the project out of compliance should be in this table to help others act to correct those errors.
All changes made to PDD's, contracts, inventories, etc.. should be reported on a changelog that stays with the verification report.
It might benefit verifiers if a single dedicated GPS device was made available for all regional verification events. This would control for errors created using multiple platforms.

DCOI - How flexible do you want to be wrt city tree management being out of step with the DCOI protocol requirements? It seems this was a common issue (minor) throughout all 4 reports.

