

# Summary and Response to Peer Review

The proposed *Methodology for the Quantification, Monitoring, Reporting, and Verification of Greenhouse Gas Emissions Reductions and Removals from Active Conservation and Sustainable Management on U.S. Forestlands* was developed Green Assets and ACR for potential approval by ACR.

All new methodologies and methodology modifications, whether developed internally or brought to ACR by external parties, undergo a rigorous process of public consultation and blind scientific peer review prior to approval.

The methodology was posted for public comment October 6, 2022 – November 28, 2022. The methodology was reviewed by an independent panel of experts January 25, 2023. Comments and responses of the peer review process are documented here.

| # | REVIEWER | DOCUMENT SECTION | REVIEWER COMMENT  | AUTHOR RESPONSE  | REVIEWER COMMENT (R2)   | AUTHOR RESPONSE (R2)  |
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| 1 | 1        | General          | <p>A number of Peer Reviewer (PR) substantive comments focus on the appraisal. PR understand that methodologies and protocols walk a fine line between integrity with the standards and burden for the developer, so PR tried to craft comments and suggestions in a constructive manner, but clearly, they intend to place a higher burden on the appraiser and the appraisal.</p> <p>PR would like to see all methodologies undergo continuous improvement for the sake of the industry and the planet. Still, the choice of how much this methodology changes is</p> | <p>Thank you for the feedback. Avoided conversion of forests is a much-needed project type outside the California compliance market. The appraisal requirements of this methodology have been designed with a high threshold for additionality and we have increased the stringency in the appraisal ratio (performance standard). The authors have made improvements to allow scalability for participation in the program, and continuous improvement will be made over time through methodology updates. The authors originally</p> | <p>Closed. PR notes in comments below that there is disagreement with some of the authors responses, but realize the burden of where to set the bar on appraisal credibility is the author’s. PR feels they have done their job to offer their perspective.</p> | <p>As authors, we’ve carefully considered the peer-reviewers closing statements. In consideration of their final feedback, we performed the following actions.</p> <ul style="list-style-type: none"> <li>• Solicited feedback from several professional appraisers in multiple regions.</li> <li>• Added methodology text to section 2.4.2 requiring the appraisal to include a description of anticipated market demand for the identified HBU, confirming that the associated industry will support the conversion.</li> </ul> |

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|   |   |         | largely up to ACR. PR suggest talking to one or more appraisers, preferably from different regions of the country.                                | debated a location-based performance standard but concluded that an appraisal approach would be better justified and achieve a higher level of integrity. The authors hope that the edits and responses assuage your concerns.      |        | After additional due diligence, and given the PR's response, we consider this Item as sufficiently addressed. Issue closed. |
| 2 | 2 | General | Requesting clarity around AC Project Design Structure: Do Avoided Conversion Projects require full or part integration of IFM project parameters? | The parameters necessary for project development, monitoring, reporting, and verification are detailed in the methodology. AC and IFM are separate project types under ACR and do not require integration of parameters in any way. | Closed | Issue closed.   |
| 3 | 2 | General | Other approved AC Methodologies require larger minimum acreage thresholds (e.g., 1,000+ acres). How does the                                      | Any level of additional carbon storage and sequestration above and beyond what would occur without the  | Closed | Issue closed.   |

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|  |  |  | <p>minimum size under this method (40 acres) contribute to meaningful levels of carbon storage and sequestration? Is this design primarily for aggregation?</p> | <p>project is meaningful. Although integrating small landowners through ACR's Aggregation/PDA approaches is an option under this methodology, the methodology accommodates all project sizes and isn't specifically targeted towards small landowners.</p> <p>The approach allows projects to evaluate their own minimum participant size necessary to overcome project development, monitoring, reporting, and verification costs, and to evolve with feasibility of carbon project development over time.</p> <p>In consideration of your comment, the authors removed the associated applicability condition to</p> |  |  |
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|   |   |             |   | better reflect the intent of the methodology.  |        |               |
| 4 | 3 | General     | Overall, the methodology is assessed as being suited to create carbon credits.  | Thank you for the positive feedback. ACR looks forward to the methodology yielding many high-quality projects that produce real and verifiable climate benefits.   | OK     | Issue closed. |
| 5 | 1 | Definitions | <p>HBU</p> <p>The performance standard relies heavily on a single concept--that conversion of the project to a non-forest use is imminent, based on the condition that the current land use is not the highest and best use. Many other definitions in this section are detailed and specific. This definition contains only one of the 4 tests required for the determination of HBU. It</p> | The authors agree that the AI's definition would add clarity to the meaning of HBU and is applicable to this methodology. The definition of HBU has been updated to reflect AI's specifications. For this methodology, the HBU is required to be defined by the qualified appraisal, and that text was not modified. | Closed | Issue closed. |

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|   |   |             | <p>could be improved by adding the Appraisal Institute’s definition of HBU— "the reasonably probable and legal use of vacant land or an improved property that is physically possible, appropriately supported, financially feasible and that results in the highest value.” The four tests could also be included here.</p> <p>PR suggests deleting the reference to the appraisal as irrelevant to the definition. A reference should be added to the current edition of the Appraisal Institute’s Dictionary of Real Estate Appraisal and any other sources.</p> |   |        |               |
| 6 | 1 | Definitions | <p>Ton</p> <p>“Ton” is typically reserved for US Ton. “Tonne” is generally</p>  | <p>ACR's usage of "ton" was decided long ago to align with our North American focus for AFOLU projects.</p> | Closed | Issue closed. |

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|   |   |         | <p>used for metric ton, the unit referenced here. This suggestion is in the interests of clarity and consistency in documents within and outside ACR.</p>                  | <p>"Ton" is notably used throughout our program documentation as part of Emission Reduction Ton (ERT), so the suggested change would be expansive. For now, so long as "metric ton" is specified, the mathematical implications are clear enough. The author's appreciate the reviewer's insight and reminder to ensure our units are clearly denoted, and will further consider whether this change is practical across the ACR program.</p> |  |   |
| 7 | 1 | 1.1, ¶1 | <p>Proposed addition to the end of 1: The performance standard assumes the conversion from forest to non-forest use is imminent, resulting from market forces that are</p> | <p>The following sentence was added to Section 1.1: "The performance standard requires a qualified appraisal to demonstrate the financial benefit of conversion to a non-</p>   | <p>The first two sentences of the newly added text clarify the rationale somewhat. The last phrase of the last sentence (as a result..) seems a little off the mark. PR suggestion is to</p> | <p>As authors, we've carefully considered the peer-reviewers closing statements. In consideration of this final feedback, we performed the following actions.</p> |

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|  |  |  | <p>documented through a qualified appraisal.</p> <p>PR highlights that this statement could add something explicit, which the reference to HBU below addresses only tangentially. Furthermore, the determination of HBU, while a necessary part of the appraisal, may not be sufficient to support the rate of conversion. The appraisal should include additional supporting justification for the project through an analysis of the speed at which conversion is likely to occur. PR suggests the appraisal may well consider a wider discussion of market forces that supports the conversion.</p> | <p>forest land use. The financial benefit of conversion must meet or exceed a benchmark value to demonstrate additionality. Once the benchmark is met, it is assumed that conversion from forest to non-forest is imminent as a result of market forces.”</p> <p>As detailed in Section 4.1, the methodology requires verifiable land conversion planning documentation, or use of conservative defaults, to define the temporal land conversion rate. The appraisal does not define the rate of conversion, but rather establishes the threat/likelihood that it will occur. While appraisers can and do understand market forces driving land use changes, it is not typical</p> | <p>leave it off and add something like this...</p> <p>Once the benchmark is met, it is assumed that market-driven conversion from forest to non-forest is imminent.</p> <p>PR disagrees strongly that the rate of conversion is simply a function of physical factors. A good appraiser would evaluate all three approaches to value. An income approach typically does evaluate the timing of income. If residential lots are expected to sell out over a 10-year window as compared to a 3-year window, a typical investor would develop a project in stages. A reasonable analysis of these market forces is a part of the income approach and is indeed typical, in fact required</p> | <ul style="list-style-type: none"> <li>● Made several revisions in section 1.1, based in part on the PR’s input. The sentence referenced by the PR has been heavily edited, but we believe it conveys the logic behind the methodology’s additionality assessment.</li> <li>● Solicited feedback from several professional appraisers across multiple U.S. regions.</li> <li>● Added methodology text to section 2.4.2 requiring the appraisal to include a description of anticipated market demand for the identified HBU, confirming that the associated industry</li> </ul> |
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|  |  |  |  | <p>that an appraiser would be comfortable speaking to the rate at which a conversion is likely to occur as the physical ability to prepare the site for alternative land use defines the rate of conversion.</p> <p>An appraiser's approach (comparable sales, income, and cost approaches) considers market forces that support conversion. The conversion rate and market forces are further addressed in response to comment 20 below.</p> | <p>in many cases. PR believes the same is true for a conversion to ag. No farmer would clear 10,000 acres in three years unless the markets were clearly there for the agricultural products, regardless of the physical ability of loggers and excavation crews to remove the trees.</p> <p>PR is willing to call this issue closed, having gone on record with their assertion that one or more appraisers should be consulted to support the authors assumptions.</p> | <p>will support the conversion.</p> <p>The feedback we collected from appraisers suggested that typically only one or two valuation approaches (most often comparable sales and income) would be used, but not all three. Whether performing a net present value analysis is common practice or not seemed dependent on the appraiser's region. Notably, appraisers in the Southeast did not characterize the type of analysis of market forces desired by the PR as common practice or typical in any way. Appraisers in the Northwest, however, suggested that, while not all appraisals would be conducted to this level of</p> |
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|  |  |  |  |  |  | <p>detail, it would not be unusual.</p> <p>Based on the feedback we received, we drafted additional text related to anticipated market demand (section 2.4.2) that we would consider additional to a typical appraisal in some regions, but not unworkable to appraisers across the country. These requirements go above and beyond what is required of existing avoided conversion programs in the USA.</p> <p>We thank the PR for their input and appreciate their perspective. In consideration of their comment and the author response we consider this addressed. Issue closed.</p> |
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| 8 | 2 | 1.2 | <p>‘Each tract/parcel or stand comprising the project area(s) must minimally be 10 acres in size, and each landowner must enroll at minimum 40 acres.’ Somewhat confusing. Please consider defining Tract, Parcel &amp; Stand. Would it be correct to state, ‘Qualifying areas must be at least 10-acres in contiguous forest cover and at minimum 40-acres in size’?</p> | <p>Thank you for this observation. Per comment #3, the authors have removed this language. The 1-acre minimum size for inclusion is embedded in the definition of forestland.</p>   | Closed  | Issue closed.   |
| 9 | 2 | 1.2 | <p>Please clarify how severed subsurface rights (e.g., natural gas) influence project eligibility and/or development.</p>   | <p>As noted in Section 1.2, this methodology is not applicable to lands with severed subsurface rights where avoiding conversion to mining is claimed.</p> <p>Lands with severed subsurface rights who avoid conversion to agriculture or</p> | <p>Closed</p> <p>Reviewer #1 adds: Subsurface rights that are removed from the bundle of rights associated with the fee interest would, logically, impact the valuation negatively.</p> | <p>Thank you for the comment. Both the As IS and HBU valuations would be equivalently reflective of the severed subsurface rights and, as such, this would not affect project eligibility and/or development.</p> |

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|    |   |          |  | development are eligible under the methodology.  |  | We consider this item as sufficiently addressed. Issue closed. |
| 10 | 2 | 1.2      | What is the influence of natural gas extraction on project development? Specifically in the case of surface disturbance versus non-surface disturbance drilling.   | If the Conservation Easement (Section 2.1.1) allows for oil and gas exploration and development, any associated removal of carbon associated with project pools and sources have to be accounted for (losses) following industry standard methods. | Closed   | Issue closed.  |
| 11 | 1 | 1.3, 1.4 | PR raises the point that all methods of sustainable forest management should, at a minimum, meet the Montreal Process Criteria as outlined for small landowners. The inference that plan developed by a consulting forester needs justification and one prepared by a state- | Section 1.3 has been revised in response to this comment. The Montreal Process Criteria are now applicable under all sustainable management options outside of certification.  | Closed with the noting of a typo in option 4. It appears to PR the intent was to say “traditional <i>knowledge</i> ” | Typo corrected. Issue closed.                                  |

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|    |   |       | <p>sanctioned or tribal program does not, seems inconsistent, if not unfair.</p> <p>PR has seen state programs that are a complete rubber stamp, with weak monitoring and enforcement. While PR might be less familiar with tribal management, it does not seem an unrealistic requirement. In addition to parallel treatment, a requirement similar to 1.3.1 would make it easier for a verifier to evaluate compliance.</p> |  |        |               |
| 12 | 2 | 1.3.1 | <p>Do small acreage (&lt;2,500 acres) landowner projects that institute commercial forestry practices over the life of the project, require a third-party audit to ensure conformance</p>   | <p>Yes, small acreage projects require 3<sup>rd</sup> party audit of conformance with Montreal Process Criteria at time of validation.</p> | Closed | Issue closed. |

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|    |   |       | with Montreal Process Criteria?  |   |                               |               |
| 13 | 2 | 1.3.1 | No mention of enrollment in a state sanctioned forestry program with monitoring and enforcement mechanisms as an option for small acreage (<2,500 acres) landowners. Why applicable for one but not the other? | We did not intend to exclude any of the options in section 1.3 from small landowners, except for the tribal-specific option. For clarity, we have revised section 1.3 using “Options”, which the authors hope clarifies the intent. | Closed                        | Issue closed. |
| 14 | 3 | 1.3   | Typo: “If the project is not subject to commerical harvest” – replace “commerical” with “commercial”   | Thank you, this edit has been made.   | This concern is now resolved. | Issue closed. |
| 15 | 1 | 1.4   | Suggested Clarification<br>Are all the listed pools applicable for both with project and baseline quantification? It appears so from the text in Section 4.1, but a  | A sentence has been added at the top of section 1.4 to clarify this. Thank you for this suggestion.   | Closed                        | Issue closed. |

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| 16 | 1 | 2.1.1 | <p>General comment</p> <p>One point about term easements not raised by the Climate Trust in the public comment about this section may be worth consideration. It is PR’s understanding that few land trusts will write term easements if the transaction includes any federal tax considerations (gifts or donations). PR believe IRS requires a perpetual easement. While ACR’s response is logical, the premise may be impractical. The Land Trust Alliance may have a useful perspective. PR raises this comment solely in the interests of keeping the methodology as straightforward as</p> | <p>The methodology is designed to allow for landowners to participate with commitments that align with the project term. Federal tax considerations are not a requirement of a conservation easement for the purpose of an avoided conversion project. Perpetual easements are acceptable, but not required. Certain landowning organizations may wish to participate in carbon markets but cannot commit to easements in perpetuity due to fiduciary issues. Not requiring perpetual easements, but rather easements that align</p> | Closed | Issue closed. |

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|    |   |       | possible; allowing other than perpetual easements seems like a complication with little practical value.  | with the project term at a minimum, potentially allows for a broader array of landowners to participate while ensuring integrity and creating a binding legal mechanism for conservation. Further iterations of this methodology, or the ACR Tool for Reversal Risk Analysis and Buffer Pool Contribution Determination, may explore incentivization for perpetual conservation easements more specifically and/or whether term easements are indeed impractical. |   |  |
| 17 | 1 | 2.4.2 | General Comment:<br>As in any profession, appraisers' experience and the quality of their work can be highly variable, yet the entire premise of the AC | The IRS standard has been added to the methodology's definition of Professional Appraiser; however, this is only applicable in the  | PR appreciates the effort the authors have put into this response. PR's original issue does not underscore a technical problem in the methodology, but rather | The authors have confidence the licensure requirements for conducting a qualified appraisal per this methodology will result in credible appraisals. |



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|  |  |  | <p>methodology rests on a qualified appraisal. In PR’s opinion, this standard could be strengthened without substantially increasing the burden on the PP, and at the same time reducing the burden on the verifier.</p> <p>Indeed, USPAP may be appropriate appraisal standard, but PR could not examine that standard without purchasing it (\$75). After consulting with an appraiser, the main criteria for challenging an appraisal would be against the competency of the appraiser for the assignment or the appropriateness and sufficiency of methods used. One concern is that the typical verifier may not be sufficiently qualified to evaluate the</p> | <p>cases of federal charitable contributions.</p> <p>The methodology requires the appraiser to obtain MAI membership, which requires:</p> <p><i>To become a MAI Designated member of the Appraisal Institute, an individual must:</i></p> <ul style="list-style-type: none"> <li>● Have good moral character;</li> <li>● Be a Certified General Real Property Appraiser (or meet equivalency)</li> <li>● Hold bachelor’s degree or higher (or be a Certified General Real Property Appraiser)</li> <li>● Meet standards and ethics requirements;</li> <li>● Pass rigorous education requirements;</li> </ul> | <p>a potential weakness in credibility and a challenge for verification. These are judgements on PR’s part, which is why PR suggests they be substantiated by others. PR feels the issue should be closed because PR has made their argument and author response is clear. That doesn’t mean PR agrees with the authors’ rationale; rather it says the author is comfortable with the risks.</p> <p>PR would interpret issue 18 as raising a similar concern.</p> | <p>Like other professional fields requiring licenses, the license itself defines a threshold of credibility in the output produced.</p> <p>The authors believe that the licensure requirements, and additional scope specificity added to the benchmark standard, will serve to alleviate challenges in verifying the appraisal associated with differences of opinion amongst individuals.</p> <p>Given the PR response and additional response and edits provided by the author team, this item is sufficiently addressed. Issue closed.</p> |
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|  |  |  | <p>quality of either the appraiser or the methods. The AC protocol under CARB references the IRS code Section 170 as a guide to professional competency and is more specific than this methodology's reference to an MAI designation (under definitions; Professional Appraiser). PR feels the IRS reference is helpful in verifying the appraiser's qualifications and should be included in this section.</p> <p>Challenging the methods is more difficult, and according to my colleague, professional boards are likely to set a high bar for sanctioning an appraiser in any case where professional judgement is involved</p> | <ul style="list-style-type: none"><li>● Pass a final comprehensive examination;</li><li>● Receive credit for specialized experience that meets strict criteria; and</li><li>● Receive credit for the demonstration of knowledge requirement.</li></ul> <p>Additionally, appraisers must be qualified to perform appraisals in each individual state.</p> <p>Identifying the specific type of land use (i.e., row crops vs. hay crops vs. orchards, etc.) would be exceptionally burdensome for an appraiser to undertake. However, the authors have added language to section 2.4.2 which more clearly requires that the expected agricultural use must be considered</p> |  |  |
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|  |  |  | <p>(as opposed to gross negligence).</p> <p>As written, this is a weak threshold for a performance standard, given the variability in appraisal and appraiser quality—particularly when the entire premise of additionality rests on this standard. It is, in PR’s opinion, considerably weaker than the CARB standard and can and should be strengthened.</p> <p><u>Physical characteristics</u></p> <p>Each bullet under “physically suitable” could conceivably be satisfied with a statement similar to this: “I have considered all of the physical characteristics of the subject property and find them suitable for conversion to</p> | <p>in the analysis of physical suitability. Furthermore, the authors have added new language to section 2.4.2 requiring the qualified appraisal to identify areas unsuitable for conversion to HBU. These unsuitable areas are then considered in baseline setting (section 4.1), for both planning documentation and the default table (Table 1).</p> <p>The authors feel that these additions should more than assuage concerns regarding the appraisal rigor and we further submit that both the verifiers and ACR will be able to review appraisals and adequately attain reasonable assurance of additionality based on both appraisal content</p> |  |  |
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|  |  | <p>[agriculture/mining/development).” A verifier might question the appraiser for details, but without specific criteria, would have no basis for a challenge should the response be “it’s based on my professional opinion.”</p> <p>PR would propose building on the CARB criteria (2015 protocol section 3.4.2 (3) (A), adding specificity to each item in section 2. PR would also add specificity to section 3 in the CARB protocol. For example, it is typical for an agricultural appraisal to be very specific about the types of agriculture likely to be suitable for different soil types or slopes—row crops, hay crops, fruit or nut crops, pasture, etc. Given the different value yields</p> | <p>and methodology requirements.</p> <p>Regarding the exact threshold for a performance standard, the authors would like to note how scant scientific literature on the topic is. However, 1.5x the current forested value is a stricter benchmark than the CARB protocol, which demonstrates additional rigor applied to this methodology compared to existing market practice. This threshold represents a significant hurdle to the project activity, especially when combined with the conservation commitment, requirement for an MAI/IRS and state qualified appraiser, and the inclusion of a conversion probability</p> |  |  |
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|  |  | <p>from different crops, this step is also key in evaluating the relative extent of similar areas on comparable sales).</p> <p><u>Highest and Best Use</u></p> <p>Much has been written in the appraisal literature about this topic, including how frequently appraisers tend not to perform a particularly rigorous analysis. PR feels strongly that it is the responsibility of ACR to ensure this aspect of the appraisal considers and formally addresses all aspects of the definition of HBU. In some cases, the determination of HBU is routine (e.g., where the last residential building along a strip mall is the subject). While it could be more clearly articulated, it is clear to PR that this entire</p> | <p>discount. The reference to “authors’ experience” has been removed.</p> |  |  |
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|  |  |  | <p>methodology relies on this determination. The proxy used (HBU value is 1.5 times current value) is weakly supported by “the authors’ experience.” PR doesn’t question this experience, but would suggest it may not be relevant for all property types in all markets across the country. PR’s suggestion is to contact one or more certified appraisers or to research published articles to better outline the expectation and deliverables for the HBU analysis. This would likely be extremely helpful in defending the project’s additionality generally, but also in supporting the role of the verifier in reaching a conclusion of “reasonable assurance.”</p> |  |  |  |
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| 18 | 2 | 2.4.2 | <p>Is there a list of Professional Appraisers that Project Proponents can utilize to ensure appraisals are performed to targeted AC standards?</p> | <p>The Appraisal Institute’s Find an Appraiser web page (<a href="https://ai.appraisalinstitute.org/eweb/DynamicPage.aspx?webcode=aifaa_search">https://ai.appraisalinstitute.org/eweb/DynamicPage.aspx?webcode=aifaa_search</a>) can be utilized to locate Professional Appraisers.</p> <p>It is the Professional Appraiser’s responsibility to ensure that the appraisal supporting a project is qualified/meets the requirements of the methodology.</p> <p>A footnote referencing the Appraisal Institute’s Find an Appraiser web page has been added to the Professional Appraiser definition.</p> | Closed | Issue closed. |
| 19 | 1 | 3     | <p>Stratification</p> <p>In most forestry contexts, stratification is undertaken to improve</p>  | <p>We appreciate this comment and have made the suggested change.</p>   | Closed | Issue closed. |

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|    |   |        | <p>sampling efficiency. While this concept is alluded to in 2 and explicitly mentioned for SOC, it deserves clearer treatment here. This might be incorporated into the text in a variety of ways. One example:</p> <p><i>(1) For estimation of initial carbon stocks, strata should be defined on the basis of parameters correlated to forest carbon stocking in an effort to reduce within strata variability and improve sampling efficiency, for example:...</i></p> |  |   |  |
| 20 | 1 | 4.1 ¶4 | <p>Temporal land conversion rate</p> <p>The conversion rate under the methodology is determined largely by physical capacity of the developer to clear the land and build any necessary</p>   | <p>This comment is appreciated, but the proposed analysis of all possible land uses places undue burden on an appraiser and is not reasonable or financially practical for a project to pass a performance</p> | <p>PR disagrees. The HBU definition says, “reasonably probable” and PR suggests nothing more. Any appraisal is a value as of a specific date, but it considers reasonably likely market forces into the future.</p> | <p>The authors have made additions to section 2.4.2 to explicitly require that the appraisal contain a description of anticipated market demand for the identified HBU, as well as confirming that the</p> |



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|  |  |  | <p>infrastructure—how long would it take to remove the tree, clear the stumps and, level the soils for agriculture? One might argue there is an economic component in this analysis, for example, is there sufficient local logging and mill capacity to handle the timber removals on a large project area? However, if the basis of the time and cost estimate is in engineering and construction, the only area of validation available to the verifier is whether the estimator has the necessary qualifications and whether contractors and markets can process the trees and wood.</p> <p>In PR’s experience, most conversion is driven as much by economic</p> | <p>standard and become eligible for participation in the carbon market. Markets change with time, and a specific point in time’s analysis will not be relevant nor accurate in future years. Forestland is continuously under threat in the United States due to diminishing demand for US-based forest products.</p> <p>Note that in many forest conversion activities, mills and timber values play no role. Conversion of forestland often occurs without consideration for the marketability of timber or mill capacity. When land is to be utilized for another reason, existing biomass is often piled and burned because the alternative use will</p> | <p>As a verifier, PR worked hard to substantiate the “likelihood” of forest conversion to ag in the immediate region (asking assessors, were other lands recently converted?) and in a broader region (what do USFS and other land use trend data suggest?) In nearly every case, PR could find little evidence that the conversions were imminent—despite the appraiser’s opinions. Citing other carbon projects as the basis for the conversion rates is an example of a self-fulfilling prophecy. Independent data can be collected with reasonable effort and should be used.</p> <p>Closed, because once again opinions differ but it’s the author</p> | <p>associated industry will support the conversion. Hence, the approach establishes the threat of forest conversion, the suitability of the site and associated infrastructure to such activities, and the necessary market demand to carry them out.</p> <p>The authors went to great lengths to seek out independent estimates of schedules for land conversion activities when creating the default table, including searching scientific journal articles, industry reports, and public agency publications. Independent data suitable for deriving the default table were unavailable, short of obtaining estimates from individual companies for individual jobs. This is</p> |
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|  |  |  | <p>criteria: what is the price of crops or the demand for timber? At what rate will residential lots be placed on the market to balance supply with demand and maximize profit? How much land for mining will be developed now, and how much when market conditions might be more favorable for the materials extracted?</p> <p>A thorough analysis of the highest and best use of a property, especially when that use differs from the existing use should incorporate a broader set of market drivers. Typically, this is done through a discounted cash flow analysis: what are the expected costs of conversion and the expected revenues from the HBU over the</p> | <p>provide significant revenues for the landowner. Given the economic and regulatory incentives for agriculture, there is consistent and economic motivation for the conversion of forestland to agriculture.</p> <p>The authors agree that the cost of conversion should be considered in the performance standard and have added a footnote identifying this in the “Benchmark Performance Standard” section.</p> <p>The default table was developed based on an analysis of conversion rates from verified avoided conversion projects in the existing carbon market. Reference to “authors’</p> | <p>prerogative to make this judgment.</p> | <p>precisely what was done when basing the default upon prior Avoided Conversion projects.</p> <p>The conversion probability discount goes further in instilling conservatism in the baseline scenario, both by incentivizing reliance on actual conversion planning documentation and by creating a credit deduction when default rates are used.</p> <p>Given the PR’s response and resulting changes we consider this Item as sufficiently addressed. Issue closed.</p> |
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|  |  |  | <p>conversion time frame?<br/>The analysis incorporates the risks involved with conversion (typically in the choice of a discount rate) and informs the choice of HBU and ultimately the choice of the comparable sales. In the process, it effectively determines the conversion rate.</p> <p>PR believes most appraisers would not argue this logic. The methodology should set this standard explicitly.<br/>PR's suggestion:</p> <p>The highest and best use analysis must</p> <ul style="list-style-type: none"><li>● identify the range of legally allowed possible alternative uses</li><li>● incorporate the costs to convert the current</li></ul> | <p>experience” has been removed.</p> |  |  |
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use to each possible use

- identify the risk involved with the conversion
- identify a reasonable span of time over which the conversion is likely to occur.

Please go over the following article

<https://www.altusgroup.com/insights/highest-and-best-use-real-estate-appraisal/>, which supports the above-mentioned suggestions.

PR would like to see table 1 eliminated as unnecessary and instead set the expectation that a land conversion rate would be a requirement of the appraisal. The framework for this change in emphasis to rely more on the appraisal already exists

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|    |   |        | <p>in the wording of sections 4.1 and 4.1.1 and in the definition of HBU. As it is, Table 1 is supported only by the “authors’ experience.” Should it remain, PR would hope for better support developed from either a range of published studies or actual historical data.</p>                          |  |        |               |
| 21 | 2 | 4.2.1. | <p>Are there any QA/QC procedures that could be adopted to better calibrate FVS growth and yield model outputs. Rationale – multiple US IFM projects reporting issues with overestimates on forecasted annual growth which creates challenges with higher credit allocations than should be received.</p> | <p>The authors agree that growth and yield models present some risk of overestimation. This risk is conceptually equally as likely for underestimation. In either instance these impacts are minimized by requiring the same growth model and parameterization to be used in both baseline and project scenarios. Ultimately, the methodology requires</p> | Closed | Issue closed. |

forest inventories (at least) every 10 years. Re-inventories identifying measured carbon estimates lower than previously modeled carbon estimates will result in an intentional reversal, requiring compensation by the project. This is a self-correcting mechanism for inaccurate growth and yield models.

Additionally, every 5 years, a project inventory must pass a full verification including resampling, as detailed in section 7.4.1. Projects relying heavily on modeling enter a full verification do so at their own financial risk.

Section 4.2.1 details requirements for model calibration, all of which are explicitly subject to validation (sections 4.2.1

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|  |  |  |  | <p>and 7.3). FVS documentation (Essential FVS and variant documentation) detail both the minimum and ideal calibration information required for model projections. QA/QC procedures for the selected calibration techniques are the responsibility of the Project Proponent and confirmation of accurate/sufficient calibration and implementation of QA/QC procedures is the responsibility of the VVB.</p> <p>The mechanisms described above (consistent modeling in baseline vs. project, periodic re-inventories, full verifications with resampling every 5 years, and validation of model calibration) serve as safeguards to prevent</p> |  |  |
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|    |   |                   |  | systemic and unchecked over-crediting from growth and yield over modeling. It is in the project developer's best interest to calibrate growth and yield models conservatively, as overestimates will be caught and penalized in inventory updates. |        |               |
| 22 | 1 | 4.2.1 ¶1          | Recommended clarification: With-project tree stocking levels must be estimated using <i>approved forest growth and yield models</i> .            | Thank you for this helpful clarification. This edit has been made.   | Closed | Issue closed. |
| 23 |   | 4.2.2.1: Option 1 | Recommended clarification: ( <i>ibid.</i> table 6)   | Thank you for this helpful clarification. This edit has been made.   | Closed | Issue closed. |
| 24 | 1 | 4.2.2.1: Option 3 | Recommended clarifications:<br>...Cairns, et al. (1997, Table 3, <i>equation 3</i> )<br>Add to 1, after the above sentence— <i>Live and dead</i> | The authors have incorporated more language into Option 3 to clarify that the scenario described by PR is not allowable. The authors have also   | Closed | Issue closed. |



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|  |  |  | <p><i>biomass shall be combined for the calculation of the below ground biomass.</i> The live and dead belowground pools may be separated by multiplying the belowground biomass density by each pool's respective proportion of total aboveground biomass <b><i>at the plot level.</i></b></p> <p>Reviewer's justification:<br/>Without the above clarification, PP might choose to separate live and dead in the calculation of the BG portion. Cairns is not specific on this point, but logic would suggest it should be computed on the entire plot level biomass. The suggested clarification simply removes an option that, unless explicitly mentioned may (and</p> | <p>specified that Equation 3 from Cairns' Table 3 must be used. Thank you for these suggestions.</p> |  |  |
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|    |   |         | has) been used by PP's. PR's view is splitting the live and dead components is inappropriate.  |   |        |               |
| 25 | 1 | 4.2.3.1 | Does the Density reduction and Structural loss get applied to AG and BG components for project using option 3 for AK, CA, OR, WA (Harmon)? Clarification would be helpful. | <p>The authors expect density reductions to be applied to the AG components prior to use in the Cairns equation for estimation of BG components. The authors believe this to be appropriate but are open to further perspective. At the very least, this would be conservative in estimation of BG carbon. A clarifying sentence has been added.</p> <p>It is the author's understanding that application of structural loss adjustments is inappropriate for projects located in AK, CA, OR, or WA using</p> | Closed | Issue closed. |

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|    |   |                 |  | Option 3. This is supported by the CARB protocol language (2015 version, Appendix A (g)(4)(B)) and has been implemented in practice by successfully verified CARB projects in the past. Again, the authors are open to additional perspective on the correct application for this region. |        |               |
| 26 | 1 | 4.2.3.2: Step 1 | The Harmon and Sexton paper uses the term line “intercept”, not intersect, though Waddell does use “intersect.”  | The term "intercept" is now used. Thank you for this observation.   | Closed | Issue closed. |
| 27 | 1 | 4.2.3.2         | General observation 1<br>“Lying dead wood is highly variable.”<br>A reference to the requirement that this directly sampled pool is subject to the same precision calculations | Observation 1: Clarifying language has been added to both section 4.2.3.2 and section 4.4, explicitly calling for lying dead wood to be included in Equation 12.  | Closed | Issue closed. |

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|  |  |  | <p>and constraints as the Standing Tree and SOC pools would be useful here. Section 4.4 does not explicitly mention this pool.</p> <p>General observation 2</p> <p>How is this pool modeled in the baseline? Is the level assumed to be depleted only from the inventoried level? In the with-project accounting, is this pool held constant or is there an option to “model” it?</p> | <p>Observation 2: Per the first and last paragraphs of section 4.2.1, the lying dead wood pool would be depleted according to the conversion rate identified for the baseline scenario. Just as with the live and standing dead trees, the initial inventoried stocking level would be depleted, without new recruitment into this pool.</p> <p>ACR's treatment of lying dead wood in the with-project scenario is outlined in the last paragraph of section 4.2.1, which allows for both modeled and purely measured approaches. The lying dead wood pool can either be modeled with an approved growth and yield model (FVS-FFE's fuel submodel, for</p> |  |  |
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|    |   |                     |  | instance), or held static between each field measurement event.  |        |               |
| 28 | 1 | 4.2.4: Step 1, I, B | <p>Recommended clarification:</p> <p>The reference to “verified” third-party scaling reports is ambiguous. Are the scaling reports verified by the reporting source, or is this meant to mean the scaling reports must be <i>verifiable</i> by the verifier? PR suggests “verifiable” third party reports, or some similar clarifying language would be helpful.</p> | The authors agree this was ambiguous. This has been changed to "verifiable".   | Closed | Issue closed. |
| 29 | 1 | 4.2.4 Step 1, II    | This paragraph allows the verifier discretion in choosing a missing species. While verifiers are comfortable interpreting the standards and methodologies, it would  | The authors agree that, on this point, consistency across projects would strengthen ACR's overall program. The methodology now requires project to | Closed | Issue closed. |

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|    |   |                 | <p>seem the registry should be the arbiter in this case. This allows for better documentation and consistency across verifiers and projects. PR recommends the statement be removed or clarified to force the PP to query ACR in the event of missing values.</p>  | <p>consult ACR for approving substitute species.</p>  |        |               |
| 30 | 1 | 4.2.6.1: Step 1 | <p>Aligning with earlier points about HBU and land conversion, this section leads PR to assume the entire area converted to agriculture (with the presumed exception of soils clearly unsuitable for conversion, physically or legally) will receive fertilizer and that credits can be generated without regard to whether land will be cropped or pastured or used for a feedlot. If</p> | <p>While the authors think there could be a viable and conservative path to accounting for avoided emissions from fertilizer application, it has been decided to omit this an accounted emission source for simplicity. This is conservative given that baseline fertilizer applications under agriculture are expected to exceed with-project applications under forests. The authors will consider this</p> | Closed | Issue closed. |

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|    |   |                 | fertilizer emissions are to be conservatively claimed, they must be claimed only for those acres that are likely to receive fertilizer and not based on the overall land conversion rate.  | comment in the instance fertilizer emissions are considered in future updates to the methodology. |        |               |
| 31 | 1 | 4.2.6.1: step 2 | <p>Description of fertilizer application practices</p> <p>Are the first 3 bullets listed in order of preference? If so, this should be stated. If not, PR foresees potential conflicts in the verification process: if the PP uses source type A and the verifier finds a conflicting source type B, how would this be resolved? Is this then negotiated with the registry? What is the presumed magnitude of a material difference? While PR does not know how regional practices</p> | Per comment #30, the authors have omitted the fertilizer application section entirely.            | Closed | Issue closed. |

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|    |   |     | differ, it would seem preferable in this case for ACR to examine this topic in more detail and <i>provide a table</i> to avoid potential differences in judgement between the developer and the verifier. Expert or local sources could possibly be used to over-ride the table in special circumstances. |   |        |               |
| 32 | 1 | 4.4 | Include a discussion here for the treatment of uncertainty for lying dead wood, including specific calculations for the line intersect method, or require these methods be specified in the PP’s inventory SOP.   | Per response to comment #27, it is now explicitly stated that uncertainty of the lying dead wood pool must be accounted in Equation 12. While the authors have chosen not to include additional specific calculations for the lying dead wood pool's uncertainty in section 4.4, the authors find merit in requiring a description of the | Closed | Issue closed. |



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|    |   |     |  | uncertainty calculations in the inventory SOP document. This requirement has been added to section 4.2.2.  |        |               |
| 33 | 1 | 5.3 | <p>Observation</p> <p>Is there a need here for a statement that requires any changes in inventory procedures be validated, and allow only those that increase accuracy? PR sees no reference to this in the ACR standard or v/v standard.</p> <p>Procedural revisions are likely and a pathway to greater accuracy should be laid out.</p> | Thank you for this observation. The authors have added language to this effect to sections 5.2 and 7.4.  | Closed | Issue closed. |
| 34 | 1 | 5.3 | A reference to the treatment of lying dead should be included here.  | Perhaps this is unclear, but the usage of the term "dead wood" is intended to be inclusive of both standing and lying dead wood. This term is used in the second bullet of section 5.3, but also | Closed | Issue closed. |

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|    |   |         |  | throughout the methodology. After consideration of this point, please let the authors know if greater clarity regarding lying dead wood would be helpful.  |        |               |
| 35 | 1 | 5.7     | It's reasonable to assume the general language would pertain to lying dead (if included), but some formal reference to that pool here seems warranted.   | Thank you for this suggestion. The authors have added language specifying the previously unnamed carbon pools in this paragraph.   | Closed | Issue closed. |
| 36 | 1 | 7.3: ¶3 | Proposed addition:<br><i>QA/QC procedures pertaining to the preparation of all major submissions should be documented in a QA/QC log. In addition to the specific review conducted, the date and individual responsible should be noted.</i> | No other ACR methodologies or protocols require such a detailed log of QA/QC procedures, so the authors are wary of introducing this requirement as suggested. In general, the authors hope that documentation of edits in response to | Closed | Issue closed. |

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|  |  |  | <p>Rationale</p> <p>The processes and accountability trail for document preparation and internal review should be part of the QA/QC procedures included in the GHG plan. This step aids verifiers' evaluation of not just the scope of the QA/QC, but in whether the plan was followed. In my opinion the "sufficient documentation" statement is open to considerable ambiguity, especially when judged against the ACR v/v standard Section 11.B</p> | <p>verification is achieved via the issues log processes conducted by the VVB.</p> <p>The authors acknowledge the desire for clearer requirements regarding document submissions during the verification process. The authors assume that some projects provide well-documented submissions, while other projects leave much guesswork and busy work for the verifiers to discover exactly which edits were made. ACR is currently revising its Validation and Verification Standard. The authors have noted your suggestions and will try to incorporate your feedback into programmatic requirements rather</p> |  |  |
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|    |   |                       |   | than within this methodology.  |  |               |
| 37 | 1 | 7.4.1                 | The text contains no reference to any verification requirements to resample lying dead, if included. This could be included in the first bullet’s parenthetical expression.   | The authors have amended this text as suggested.   | Closed                                 | Issue closed. |
| 38 | 1 | Appendix A, Section A | <p>Recommended clarification regarding resampling of SOC...</p> <p>“SOC, if included and directly sampled...must also be resampled <i>following the same procedures used by the Project Proponent.</i>”</p> <p>Discussion</p> <p>PR is not sure this is what the authors intend or imply, but some elaboration seems warranted. Are verifiers allowed or encouraged</p> | The PR raises a valid point regarding the logistical challenges associated with verification of field sampled SOC data. The authors propose amending the methodology to limit the scope of validation of SOC direct sampling to the following elements: inventory design (SOP document), its implementation, chain of custody of soil samples, and the | This is a reasonable solution. Closed. | Issue closed. |

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|  |  |  | <p>to use a lab of their choice? Are verifiers permitted to sample at a location on the plot other than at the same exact spots where the original sample was collected, especially since samples are aggregated? If a combination of methods (Direct and SSURGO) are used, and if direct sampling is done for other than map units, are PPs obligated to use the more conservative estimate of SOC? (Section A.1.3)</p> <p>It would seem that a SOC direct sampling method carries considerable verification risk. The site visit pass/fail would have to be postponed until the results of the verifier's lab tests are returned. If the results don't agree (Soil carbon</p> | <p>laboratory results. As a further safeguard to ensure faithful implementation of soil sampling, the SOC inventory SOP document now requires georeferenced photographic evidence of each sample collected; these would also be subject to validation.</p> <p>If a combination of methods is used, PPs are not obligated to use any particular data source for any area. The authors do not find it necessary to make this clarification in the methodology text, but are open to further perspective.</p> |  |  |
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|    |   |                         | <p>can be quite variable.), verifiers may need to return for another site visit, though PR appreciates the PP has other options in the event of a failed t-test.</p>  |  |  |                      |
| 39 | 3 | Appendix A, Section A.1 | <p>Incorrect use of Soil Taxonomy. Comment is based on: Keys to Soil Taxonomy, Thirteenth Edition, 2022, available here <a href="https://www.nrcs.usda.gov/sites/default/files/2022-09/Keys-to-Soil-Taxonomy.pdf">https://www.nrcs.usda.gov/sites/default/files/2022-09/Keys-to-Soil-Taxonomy.pdf</a></p> <p>Phraseology in method: "Organic soils are defined as all non-Folist Histisols and all non-Folistel Histels."</p> <p>There is a typo in Histisols = should be Histosols. More importantly, to avoid</p> | <p>The authors are appreciative of this feedback and have made the edits as suggested.</p> | <p>This concern is now adequately addressed.</p> | <p>Issue closed.</p> |

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|    |   |                           | <p>confusion, rephrase as "For the purpose of this methodology, the term "organic soils" includes, within the order of Histosols, all suborders other than Folists and, within the order of Gelisols, only the members of the suborder Histels other than the great group of Folistels"</p> <p>Reason: terms such as "Folist Histosol" or "Folistel Histel" are not strictly part of soil taxonomy and may be confusing.</p> |  |  |                      |
| 40 | 3 | Appendix A Section A1.1.1 | <p>Accuracy of the accounting framework for direct carbon sampling:</p> <p>The method states that "The collection and aggregation of at least four SOC cores per plot is</p>   | <p>Thank you for this comment and references. The authors have proposed 20-foot SOC plots with 6 cores taken per plot. The authors have specified that each core must be</p> | <p>This concern is now adequately addressed.</p> | <p>Issue closed.</p> |

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|  |  |  | <p>required to reduce variability."</p> <p>The number of replicate samples required must be made dependent on plot size. Reviewer was unable to find information on plot size in the method. Without knowledge of the intended plot size, there is no way to judge the appropriateness of taking 4 replicate samples.</p> <p>To appreciate the importance of the matter, compare</p> <p>Post, W.M., Izaurralde, R.C., Mann, L.K., Bliss, N., 2001. Monitoring and verifying changes of organic carbon in soil. Special Issue: storing carbon in agricultural soils - a multipurpose environmental strategy. Clim. Change 51 (1), 73–</p> | <p>located within a unique sextant of the plot to ensure sufficient within-plot distribution.</p> |  |  |
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|    |   |                           | <p>99. <a href="https://doi.org/10.1023/a:1017514802028">https://doi.org/10.1023/a:1017514802028</a>.</p> <p>Garten Jr, C.T. and Wullschleger, S.D., 1999. Soil carbon inventories under a bioenergy crop (switchgrass): Measurement limitations JEQ Vol. 28, No. 4, pp. 1359-1365</p> <p><a href="https://doi.org/10.2134/jeq1999.00472425002800040041x">https://doi.org/10.2134/jeq1999.00472425002800040041x</a></p> <p>Wuest, S.B., Schillinger, W.F. and Machado, S., 2023. Variation in soil organic carbon over time in no-till versus minimum tillage dryland wheat-fallow. Soil and Tillage Research, 229, p.105677.</p> |   |   |               |
| 41 | 3 | Appendix A Section A1.1.2 | There is a serious concern with the proposed procedure to   | The authors have included a correction in Equation 33 to account for coarse rock fragments, including | This concern is now adequately addressed. | Issue closed. |

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|  |  |  | <p>measure soil carbon stocks:</p> <p>Text in the method:</p> <p><i>"The following equation multiplies percent carbon, bulk density, and volume per hectare at 30 centimeters sampling depth (3000)"</i></p> <p>This rule is flawed as it does not account for rock fragment content. Rock fragments are solid, mineral particles greater than 2mm. Rock fragments can occupy significant parts of the soil volume. The correct equation to determine carbon stocks in a soil horizon of given depth is:</p> <p>Organic matter stock [kg m<sup>-2</sup> per depth increment] = OM content [%] • bulk density [g cm<sup>-3</sup>] • (100 – % coarse fragments by volume) / 100 • horizon thickness [dm]</p> | <p>instructions for conversion of mass to volume. Additionally, the authors added a sentence to section A.1.1.1 (end of last paragraph) to provide more explicit instructions for instances where larger (&gt;10 mm) coarse fragments cannot be included in soil cores.</p> |  |  |
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Example: For a soil horizon with a thickness of 30 cm (= 3 dm), a bulk density of 1 g cm<sup>-3</sup> and a rock fragment content of 25% and an organic carbon concentration in the fine earth fraction of 5%, this amounts to

5% C conc ´ 1 (BD) ´ 3  
 (depth in dm) ´ 0.75 rock  
 fragment correction  
 [(100-25)/100] = 11.25 kg  
 per m<sup>2</sup>

Leaving the rock fragment correction out of the equation will lead to an erroneous C stock value of 15 kg per m<sup>2</sup> = an overestimation of a magnitude of 3.75 kg C m<sup>2</sup>.

Estimating rock fragment volume from rock fragment mass using a density value of 2.6 g cm<sup>-3</sup> (as in Feldspar

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|    |   |                         | <p>or Quartz) is deemed acceptable.</p> <p>Measuring accurate soil carbon stocks hence requires representative bulk samples, not just soil cores!</p>   |  |        |               |
| 42 | 1 | Appendix A, Section A.2 | <p>Observation</p> <p>Wei, et. al (in PR reading) clearly assume the land is cultivated. In different regions eligible for this methodology, this assumption may not hold (see earlier comments re the appraisal). Furthermore, depending on the region, conservation methods—no till, low till—are increasingly being adopted for row crops—methods that mitigate SOC loss or in some cases, build SOC. As it stands, the SOC loss rates based on the assumption of a 100%</p> | <p>While the authors recognize the increased popularity and implementation of regenerative agriculture practices mentioned by PR, annual till and fertilizer intensive management regimes remain the most commonly used and cost-effective options in commercial agriculture systems. Due to economies of scale associated with minimum financially feasible acreages for participating in the carbon market, it is reasonable to assume</p> | Closed | Issue closed. |

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|  |  |  | <p>cultivated project area seem overly generous. It might be possible to incorporate some of these considerations into table 4 (tilled vs. other?), but that would obviously need addition literature review or expert input.</p> | <p>that total project area sizes under this methodology employing a baseline agriculture scenario will be commercial in nature, and, therefore, likely to seek profit-driven management decisions such as annual till practices.</p> <p>The physical conversion of forestland to annual crop systems will reduce SOC stocks through geophysical processes described in PR reading. Annual row crop systems provide fewer litter inputs than forested systems regardless of soil conservation practice (Novara et al 2015). Forested systems result in more ‘diverse’ litter inputs that better moderate soil temperature and moisture content which</p> |  |  |
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facilitate microbial activity SOC accumulation (Lawrence & Foster 2002).

Finally, the conservative SOC stock computation methods, combined with the methodology's ERT deductions (leakage and uncertainty), conservative exclusion of crediting for with-project SOC accumulation (all depths) and baseline SOC at depths greater than 30cm, more than compensate for any areas that might use conservation methods in the baseline scenario. Moreover, in agricultural conversions, areas at high risk of conversion typically coincide with the most productive soils (correlating with HBU and row cropping) and, thus, Avoided

