SUMMARY OF PUBLIC CONSULTATION

VM0042 Methodology for Improved Agricultural Land Management, v2.0

A draft of *VM0042 Methodology for Improved Agricultural Land Management v2.0* was open for public consultation between 15 December 2021 and 5 February 2022. This document includes a list of each comment received and a summary of Verra's responses after the VVB assessment was completed.

Verra is grateful for the support from the following list of experts (listed alphabetically) who supported for select comments: Adam von Haden, Annette Cowie, Beth Ziniti, Beverly Henry, Brian McConkey, Charlie Brummit, Ciniro Costa-Junior, Cole D. Gross, Cornelia Rumpel, Dan Kane, Denis Angers, Emily Kyker-Snowman, Emily Oldfield, Eyal Ben-Dor, Johannes Lehmann, John Wendt, Jonathan Sandermann, Jose Lucas Safanelli, Margaret Kosmala, Rich Conant, and Stefan Hauser.

KEY QUESTIONS

Q1: Are the newly introduced exceptions to allow land use changes from cropland to grassland or vice versa restrictive enough to ensure environmental integrity?

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1	EKI Energy Services Limited	No. There should be some clauses on the grazing management under land use conversion from cropland to grassland or grassland to cropland. Free range grazing is a major driver of land degradation in developing country like india which must be	The commenter makes a good point about overgrazing being a driver of degradation. Appendix 2 lists stringent procedures for demonstrating degradation in the baseline scenario using an approved CDM Tool and showing how the project scenario will rehabilitate the degraded lands. We propose that a one-time conversion be restricted to the

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		addressed during the land use conversion.	second type of allowed land use change focused on reversing degradation. We added the following red text into the second bullet of Applicability condition 2: "A one-time conversion from grassland to cropland or vice versa …" and into the third paragraph of Appendix 2: "This exception allows for a one-time conversion from grassland to cropland or vice versa and requires.." For the first type of allowed land use change focused on converting temporary grassland into cropland using Integrated Crop-Livestock Systems and related management systems, we believe the conversion could happen more than once and still deliver positive benefits, i.e., annual crops could be reintroduced into a grassland system that was initially incorporated into degraded cropland. This the crux of these highly integrated and holistic ICL systems that essentially maximize synergies between animals and plants – see for example Peterson, et al., 2020 (https://doi.org/10.1371/journal.pone.0231840) or Sekaran, et al., 2021 (https://doi.org/10.1016/j.jafr.2021.100190). The details for this would be outlined in the required long-term management plan for the system which could be verified by the VVB and outside expertise as needed. We agree that international studies may not be relevant if not conducted under similar conditions as in the proposed project region. We reached out to numerous experts who have published in the area of land degradation and restoration including Dr Leigh Ann Winowiecki, Dr Annette Cowie, Dr Pete Smith, Dr Sarah Wolff and Dr Hans-Peter Liniger. Drs Smith and Cowie (who published this meta-analysis on practices that combat land degradation in GCB, https://doi.org/10.1111/gcb.14878, and this framework for reversing land degradation in Env Sci & Pol, https://doi.org/10.1016/j.envsci.2017.10.011,

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			respectively) responded. Both expressed support for the overall approach described in Appendix 2 and noted the importance of allowing LUC to enable restoration. They further noted that international studies can be applicable where they pertain to similar soil types, environments and interventions, and suggested some additional evidence types. Based on this we modified the text so that the relevant sentences now read "Evidence types may include local expert analysis and relevant local, regional, or national studies. Where those are not available, international studies conducted under similar biophysical and climatic conditions and with comparable management practices may be used. Evidence may further include quantification of recognized indicators of degradation by direct measurement, proximal or remote sensing, and/or modelling."
2	Carbon Count	Does grassland include pasture?	Per the VCS Program Definitions grassland does include pasturelands.
3	eAgronom	We welcome that change as it allow us to work with degraded lands. Many farmers ask us whether we can develop a carbon project to help fund rehabilitation programs. The new exceptions will help. Hopefully the VVBs will work within the spirit of the program and ensure land use change does in fact generate positive environmental outcomes.	1. We propose that a one-time conversion be restricted to the second type of allowed land use change focused on reversing degradation. We added the following red text into the second bullet of Applicability condition 2: "A one-time conversion from grassland to cropland or vice versa …" and into the third paragraph of Appendix 2: "This exception allows for a one-time conversion from grassland to cropland or vice versa and requires.." For the first type of allowed land use change focused on converting temporary grassland into cropland using Integrated Crop-Livestock Systems and related management systems, we believe the conversion could happen more than once and still deliver positive benefits, i.e., annual crops could be reintroduced into a grassland system that was initially incorporated into degraded

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			cropland. This the crux of these highly integrated and holistic ICL systems that essentially maximize synergies between animals and plants – see for example Peterson, et al., 2020 (https://doi.org/10.1371/journal.pone.0231840) or Sekaran, et al., 2021 (https://doi.org/10.1016/j.jafr.2021.100190). The details for this would be outlined in the required long-term management plan for the system which could be verified by the VVB and outside expertise as needed. 2. We agree that international studies may not be relevant if not conducted under similar conditions as in the proposed project region. We reached out to numerous experts who have published in the area of land degradation and restoration including Dr Leigh Ann Winowiecki, Dr Annette Cowie, Dr Pete Smith, Dr Sarah Wolff and Dr Hans-Peter Liniger. Drs Smith and Cowie (who published this meta-analysis on practices that combat land degradation in GCB, https://doi.org/10.1111/gcb.14878, and this framework for reversing land degradation in Env Sci & Pol, https://doi.org/10.1016/j.envsci.2017.10.011, respectively) responded. Both expressed support for the overall approach described in Appendix 2 and noted the importance of allowing LUC to enable restoration. They further noted that international studies can be applicable where they pertain to similar soil types, environments and interventions, and suggested some additional evidence types. Based on this we modified the text so that the relevant sentences now read "Evidence types may include local expert analysis and relevant local, regional, or national studies. Where those are not available, international studies conducted under similar biophysical and climatic conditions and with comparable management practices may be used. Evidence may further include quantification of recognized indicators of degradation by

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			direct measurement, proximal or remote sensing, and/or modelling."
4	Nutrient Management Institute	Under changes inpre-existing management, under the subheading improve water management, you could also specifically mention: groundwater level management. By adjusting the groundwater (e.g. in the Netherlands this is part of land management) you can e.g. reduce peat oxidation.	Comment relates to Appendix 1. Added example practice into Appendix 1
5	Agoro Carbon Alliance	p.9 "Introduction of temporary grassland into cropland is allowed where it can be credibly demonstrated prior to project validation that the integration of perennial crops (e.g., grasses, legumes) into annual crops is planned as part of a long-term agricultural management system (e.g., Integrated Crop-Livestock System integrated crop-livestock system). In this case, projects must provide documentation on the long-term management plans that cover the duration of the proposed project". We believe that further clarification is needed on the definition of long-term agricultural management system and long-term management plans, and the content of those.	Please see response to comment #3.
6	Terra Carbon, LLC	The guidance in Appendix 2 and the requirements in the "Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities" provide the necessary	We agree with the commenter that restoration of degraded lands to non-crop/grasslands can also generate substantial GHG and other cobenefits. The incorporation of woody spp is already allowed and could be part of the restoration activities in an agroforestry context under the proposed

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		criteria to ensure the lands are degraded and that project activities will reverse degradation and lead to improvements in soil health, productivity, and livelihoods. However, this new allowance for restoration of degraded land only considers lands that would remain cropland or grassland once degradation is reversed. In many ecosystems–both in the United States and in tropical smallholder agroecosystems–restoration of degraded agricultural land may involve natural regeneration of woody species as cropland or grassland restores to riparian buffer, woodland, or forest, particularly when restoration of degraded land occurs at the edge of fields. Such restoration would be beneficial from several perspectives, with woody plants providing a larger carbon sink and an opportunity to diversify livelihoods and production systems on a farm (such as woody fodder alongside grazed pasture or non-timber forest products alongside crop or agroforestry systems). Potential incorporation of restoration to native ecosystems that include woody vegetation would also allow a grouped project to take a more holistic approach to its interventions, with practices that improve crop productivity and soil health implemented alongside practices that restore ecosystems at the edge of field–allowing a project to maintain or boost productivity across the project as a whole while deepening its impact. Thus, the proposed exception would be more broadly applicable and beneficial were it to also consider and	approach. Natural regeneration to native ecosystems though, is best handled by other methodologies such as the soon to be published VCS ARR methodology. Furthermore, allowing degraded crop/grasslands to be converted to some other land use/cover than crop/grasslands would further complicate the methodology and raise new concerns around for example leakage. For these reasons, we are not making any changes.

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		allow opportunities for restoration of degraded lands to functional (agro)ecosystems other than cropland or grassland.	
7	South Pole	If a shift in the production system (related to ecosystem conversion) occurs, the derived products will most likely change. This would mean that the comparison between historic averages and ongoing activities to comply with leakage checks in 8.4.3. might be constrained.	The commenter raises a good point which is in fact also applicable to new crop/livestock products introduced into the project, even if there is no grassland to cropland conversion or vice versa. However, the procedures in Section 8.4.3 can still be applied to satisfy leakage concerns around productivity declines. Specifically, Step 2 and Equation 31 in 8.4.3 could be used with data from government, industry, peer reviewed publications, etc. and setting Pbsl,p equal to RPbsl,p. We believe it is credible to assume that the crop/livestock product (not grown in the baseline scenario) would have had the same productivity historical productivity as the regional average. We added new guidance to 8.4.3 Step 2 to clarify the procedures.
8	Indigo Ag	These new exceptions to allow land use change from cropland to grassland or vice versa appear restrictive enough to ensure environmental integrity, but may fall short of properly accounting for leakage that may occur as a result of reduced cropland production (i.e. drops in yield).	We have added new text in Section 8.4.3 Accounting for Leakage from Productivity Declines to describe procedures in situations where new crop/livestock products are introduced in the project scenario which is applicable to this comment.
9	First Climate	We agree that these exceptions are ok with the stated "improvements in soil health and associated socioenvironmental benefits" including the requirement for increasing soil carbon stocks and the appropriate choice of baseline (i.e. cropland to grasland should have an increasing baseline according to	Please see response to comment #3.

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		modelling that is not accounted for carbon certification).	
10	Bluesource	The reference to the use of scientific literature lacks integrity when not making the distinction that it must be peer reviewed. Also, the lack of requirement to measurement the effectiveness of the land use change reduces integrity. We believe for undebatable improvement via a change in land management requires you to have some level of quantification.	1) It is unclear what the commenter means by reference to scientific literature-- there is no reference in the applicability condition nor appendix. However, we agree that peer-reviewed literature is important. 2) We believe the safeguards put in place in the applicability conditions and appendix are sufficiently stringent. Measuring effectiveness of the land use change could only be done ex-post and is further unclear what is meant be effectiveness. We believe that the CDM Tool is sufficiently robust and includes quantitative measures of degradation
11	John Deere	We are highly supportive of the introduction of these exceptions. The addition of integrated crop-livestock systems as part of a long term agricultural system will not only expand the opportunities for project generation, particularly in tropical regions, but has the potential to create positive impacts on social systems and biodiversity.	Please see response to comment #3.
12	Climate Neutral Group	A suggestion is to use the concept 'farmland' as opposed to the distinguishable land use concepts cropland vs. grassland. Like this land use change allowance can be avoided. Moreover, integrating cropland and grassland based agricultural activities is appropriate to sustainable farming systems, based on progressing scientific insights. In addition, it might be impractical to obtain long-term management plans that covers the duration	Cropland and grassland are well-established agronomic terms used in GHG programs and have their own chapters in the IPCC Guidelines for National Greenhouse Gas Inventories AFOLU Volume 4. This because they are managed differently and require different considerations for GHG accounting. Hence we will maintain the cropland and grassland terms. Regarding the last point about long-term managment plans, it is not specified that these need to cover 100 years. The

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		of the proposed project, which can become a 100 years (VCS Standard, v4.2, para 3.8.3).	referenced section of the VCS Standard refers to project crediting period duration, which can be a minimum of 20 years.
13	Arva Intelligence & UC Berkeley & Lawrence Berkeley National Laboratory	Please improve language surrounding water management and irrigation; it is not clear on what types of water management practices would qualify as improvement. Generally increased irrigation results in improved carbon sequestration -- but of course the cost of water is not without a carbon footprint. We anticipate that inclusive and encompassing approaches to land management will be important for the long-term viability and desirability of originated carbon credits. Additional language around "improve residue management" would be helpful: define residue management.	Commenter makes a good point re irrigation effects on SOC stocks. Appendix 1 examples on water/irrigation and residue management added and clarified. We agree that further clarification of the added potential ALM practice of 'groundwater level management' could benefit from an example. We have included an example of groundwater level management as suggested by the commenter in row 238 that recommended inclusion of this practice: ●Groundwater level management (e.g., adjust groundwater levels to reduce peat oxidation). We are aware that some lands that contain peat soils may be classified as wetlands and would be excluded per the VM0042 applicability conditions. However, where the PP could demonstrate that the project lands are not wetlands, this could be an eligible practice given that oxidation of peatlands is a significant source of global GHG emissions.
14	Terra Global Capital	Terra believes the two exceptions to allow land use changes from cropland to grassland or vice versa were neccesary, as conversion has proven to be an effective solution to improve degraded lands into healthy soils. Both land use changes are restrictive enough to ensure environmental integrity. As in the case of cropland-grassland conversion, project proponent has to demostrate a long term management plan, and in the case of grassland to cropland conversion, the level of degration has to be demostrated through CDM tool and include a list of demostrated	Please see response to comment #3.

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		land improvements.	
15	Radicle	Yes, the revision kept the environmental insurance of the practices, while allowing more flexibilty throughout the crediting period, as long as they are properly documented and demonstrated. However, examples in Appendix 1 could also include integrated systems, which are applicable in tropical regions such as Brazil (please see General Comments for further notes).	Please see response to comment #3.

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16	Boomitra (ConserWater Technologies Inc.)	For Table 7, on similarity criteria, we find it concerning that Climate Zone similarity is only a Tier 3 criteria. A location's climate deeply affects the sequestration rate that occurs in a given region, and should thus be a Tier 1 criteria. Otherwise, there is the propensity for a project to selectively choose baseline sites in a climate zone that experiences negative sequestration due to the	First, we agree with the commenter that Climate Zone is an important criterion to include. That said, in our updates to Table 7 we are proposing to remove the Tiering approach such that all similarity criteria now must be included without any difference in prioritization. Second, baseline control sites should adhere to the baseline

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		effects of climate change, and thus inflate the carbon credits produced in a different climate zone where that is potentially not the case. This would undermine confidence in the credits produced by the methodology. There are only 12 IPCC climate zones, and significant portions of the planet are in each zone – since there are no proximity requirements for baseline control sites, it should also not be unreasonable to locate control sites that belong within each climate zone and meet all other similarity criteria required. Secondly, we would also like a clarification on what would be the course of action if characteristics of baseline sites change over time and lead to the similarity criteria no longer being met. For example, at the first verification event, the chosen baseline control sites could potentially match in all the criteria. However, if the management of the control site changes to differ from the historical management between the first and the second verification event, the baseline control site is then no longer similar to the baseline scenario of the linked sample units at the time of the second verification event. How can we deal with instances such as this? One possible method is for the baseline control sites to be open to reevaluation and reselection if such an instance arises at the time of a future verification event. In such a case, new baseline control site(s) that are similar to the baseline scenario during the given monitoring period are used.	schedule of activities. We added new language to allow for some adjustments to the schedule of activities where extenuating circumstances arise (e.g., stop irrigation due to excessive rainfall). Furthermore, there is a new requirement in the VCS Standard that requires reassessment of the baseline every 10 years or less for ALM projects. So this would be one way for the baseline to be updated.
17	Gaiago	"section 8.2, page 27, Table 7 : The fact that the percentage of soil organic carbon must be within the uncertainty range (i.e., not significantly different) of average % SOC of linked sample unit will be extremely	Based on consultations with our ad hoc expert group, we believe it is impractical and inappropriate to set a fixed range threshold since the starting %SOC values can vary widely, e.g., 1% +/-0.5% is very different from 4% +/-0.5%. The experts agreed that maintaining the

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		hard to implement in practice. Our company has performed high quantities of soil samplings in France in 2021 : we have found high variability even within the same plots. The high spatial variability of SOC is confirmed by all studies about SOC measurement. Instead of asking for SOCs not to be significantly different, the methodology could ask that the difference between organic matter rates to be below 0,5, leading to intervals of 1 (ex : if a control site has an organic matter rate of 2,5, linked sampling units can have organic matter rates between 2 and 3). As long as the SOC is in this range and the soil is in the same USDA soil class, it could be considered that soils are similar. Such intervals seem possible to implement in practice, while the statistically different requirement would make it hard to find control areas even on the same plot. section 8.2, page 27, Table 7 : Similarily, it will be extremely hard to find bulk densities that are not significantly different as there is a high spatial variability of bulk density. Instead of asking for bulk density not to be significantly different, the methodology could ask that the difference between bulk densities to be below 0,05 (ex : if a control site has a bulk density of 1,3, linked sampling units can have obulk densities between 1,25 and 1,35)."	approach of demonstrating no statistical difference in %SOC values is the best approach scientifically. We did clarify that this should be at the 90% confidence level. We acknowledge that there is high variability in SOC and that to achieve this statistical matching will require upfront investments in adequate sampling density. We have added additional guidance and resources on stratification and sampling to facilitate this process.
18	Carbon Count	Use of baseline control sites requires old farming practices to be maintained which increases economic barriers (e.g. the farmer may need to maintain two sets of equipment). Baseline control sites also don't take into account inherit properties of within soils and their formation, resulting in different behaviour and performance when sequestering carbon.	1) It is possible that a farmer/manager of a baseline control site may have to maintain two sets of equipment. We expect that project proponents will enter into arrangements with operators of control sites that compensate them for their efforts. Furthermore, because a control site can be linked to multiple project sites, this potential issue would only affect a smaller number of project participants. Finally, control sites can also be maintained by non-participating entities, e.g., government extension stations, university research

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		Recommendation is to not use baseline control sites and opt for direct measurement prior to changes in practice. Sufficient historical data to justify carbon stock prior to changes in practice could also generate a baseline.	plots, which would not be affected by this issue. 2) The intent of the similarity criteria is explicitly to address differences in soil properties and ensure parity at t=0. 3) We disagree with the commenter's recommendation. Control sites represent a sort of dynamic baseline for direct SOC measurement that take into account the importance of weather variability and make it comparable to the modeled SOC with a similar dynamic baseline.
19	eAgronom	Table 6 and 8 both suggest that bulk density should be measured. This seems inconsistent with the ESM approach. The ESM approach doesn't require bulk density measurement.	Table 6 and 8 list model inputs, which are relevant for quantification approach 1, and these include bulk density for modeling. The requirement to report SOC stock changes on an ESM basis is valid for both quantification approaches 1 and 2 where direct measurement is used (for QA1 direct measurement is required for true-up every 5 years or less).
20	Agoro Carbon Alliance	Section 8.2. stipulates that the control site should be "sufficiently large" to ensure that changes in stocks are driven by management practices. Any guidance on how to define the minimum size of a control site would be helfpul.	We have added further guidance explaining that control sites must be sufficiently large to ensure normal farm operations. However, the ad hoc expert group advised not to include fixed size given the wide variation in farming systems, e.g., monocrop soy/maise vs almond orchard vs smallholder diversified annual/perennial systems.
21	4p1000	for selection of the baseline site, historic management should have been similar for how many years? Baseline control sites should represent project site. If stratified sampling design is used, soil properties will be different in the different strata, requiring according to your description a specific baseline scenario site	We have modified the language in Table 7 pertaining to historic management and clarified that 5 years of practices need to align. We agree that if stratification is employed (as recommended) that each stratum will have at minimum one linked control site.
22	Terra Carbon, LLC	"The requirement that aspect of the control sites be within 30 degrees of the cardinal direction of the linked sample unit only seems relevant in cases where the	1) We agree with the comment that aspect is only relevant for steeper slope classes and have adopted the suggestion of only making this a requirement for steeper slope classes (i.e., hilly, steep,

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		sample unit and control site are in a steeper slope class. Furthermore, clarification is needed on how this rule applies in situations where the aspect of multiple parcels within the same sample unit is variable. Consider making this a requirement only in steeper slope classes where aspect may affect accumulation of precipitation or erosional processes. We disagree with the lack of a proximity requirement for control sites. In addition to the criteria currently listed, weather conditions and local market/economic factors are likely to strongly influence outcomes both in the control and project sites. Climate zone is currently listed as a matching criterion, but climate zones are coarsely defined. We suggest including a proximity requirement with the intent of ensuring comparability of weather and economic conditions. The proposed revisions require that baseline control sites implement the schedule of activities as determined by the historical lookback period for the full duration of the project, only reevaluated at the end of the crediting period to ensure the dominant crops of the region have not changed. However, an exact replication of the schedule of activities into the future would not necessarily be a true representation of what would have happened in the absence of the carbon offset project, nor is it realistic to think this is achievable in many cases. In particular, the choice of which cash crop to plant in a given year is a decision contingent on weather, commodity markets, and a variety of factors unrelated to a carbon project. A farmer who is left to their own decision making for cropping and cultivation	very steep, per the USDA soil slope classes). 2) Based on input from the ad hoc expert group, we have inserted a new proximity requirement of 250km. Furthermore, we added new similarity criteria around historical land cover, soil order/group and mean annual preciptation which will further ensure that control site will serve as a suitable comparison to the linked project site(s). 3) First, per the new rules in VCS Standard v4.2, ALM projects are required to reassess their baseline every 10 years or less. Second, we agree that assuming that the historical baseline repeats into the future without deviation may be an inaccurate depiction of reality. We further agree that allowing a blended baseline approach could help address this issue. We note though the potentially significant updates and complexity needed to incorporate a blended baseline -- see for example Appendix E in the CAR Soil Enrichment Protocol https://www.climateactionreserve.org/wp-content/uploads/2022/06/Soil-Enrichment-Protocol-V_1.1-final.pdf. We therefore intend to scope and incorporate a blended baseline in a future revision and in the meantime allow individual projects to propose these via methodology deviations which should be allowed per the VCS rules since a blended baseline relates to monitoring/measurement and will not negatively impact GHG quantification -- see VCS Standard Section 3.18. 4) We agree that emering technologies like RS have potential for ALM projects in various ways. RS could already be used for example for stratification and control site selection. However, creating guidance on the use of RS is beyond the scope of this revision in v2.0. We are currently entertaining a concept note for RS of SOC stocks which may address some of the opportunities proposed in the comment.

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		practices year-to-year is just as–if not more–representative of what would have happened in the absence of the project. We suggest that Verra consider allowing a baseline approach in Quantification Approach 2 similar to the blended baseline approach we suggest in our general comments also enclosed here. Emerging technologies like remote sensing may make it possible to establish and remotely monitor numerous baseline control sites on properties outside the project boundary but that meet the control site matching criteria. Further, remote sensing tools could be used to determine with reasonable accuracy what crops and management practices were implemented on those sites historically and year over year during the project. Such an approach could yield a robust, dynamic baseline, but at present would likely not be permissible given requirements regarding implementation of the baseline schedule of activities and the potential requirement to use direct measurement tools on control sites. We suggest that Verra begin consideration of such an approach as it continues to consider how remote sensing tools for SOC measurement can be employed within projects. "	
23	South Pole	See comment 3ff: Is the recommendation to allow for a regionally specific benchmark development or modelled baselines aligned with the wider requirements in VM0042 and VDM0053. The required minimum sampling requirements appear too coarse to accurately allow for comparison. Clarification by Hannes (17 Mar 2022): Yes the focus was on the measure-remeasure approach. We were	To clarify, the inclusion of baseline control sites does not preclude the opportunity to develop a SOC performance benchmark according to the VCS rules on PBs. That said, at this stage we are not introducing proxy measures such as NDVI, biomass, etc. that the commenter proposes for baseline control site selection and/or monitoring. It is important that the similarity criteria are met to establish comparability at t=0 between control and project sites.

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		wondering if it would be possible to determine the comparison baseline (i.e. control plots) not through measurement but for example a combination of different factors that drive SOC, i.e. NDVI, biomass production etc, which indicate that the regionally common practice has been maintained and justify the continuation of the static baseline. Some of our partners indicated concerns considering the control site selection and rather opted to justify static baselines as long as regional averages for key variables are maintained.	
24	robofarm GmbH	No, the criterion for control site similarities should be loosened instead. There are already too many combinations of factors for control site selection and we should rather have less. The control site similarity criteria easily leads to a state explosion, resulting in thousands to tens of thousands of possible combinations. For example, with five soil slope classes, six aspect classes, 12 USDA soil classification types, e.g. three SOC classes, three bulk density classes, we already get 3240 possible combinations. And this is not even considering how the land is managed, and other properties. This means control sites most likely need to be geographically adjacent to their linked sample units.	We understand the commenters concern however it is purely hypothetical. In practice, we expect that projects will have only a limited number of combinations of project and linked control sites. For example, criteria such as soil order, climate zone, precipitation, native vegetation and historical land cover will often overlap in the same region with similar histories of land use, cropping systems and underlying geology that affects soil types. As such, we are keeping the similarity criteria in Table 7 which ensure rigor of the control site approach.
25	Native	We are generally concerned about the use of control sites for a dynamic baseline. Perhaps this is possible in highly controlled environments (plantation forestry, large-scale crop agriculture) or in nations where public agencies maintain monitoring sites, inventory, and databases of natural resources (e.g. USDA Forest Inventory and Analysis). However, in a rangeland context, finding a paired site with near-exact characteristics and/or being able to properly control for new effects in an isolated part of the project area seems	We understand the commenters concern around practicality of control sites in the rangeland context. We suggest though that grazing/rangelands can be relatively homogenous relative to more complex annual cropping systems and it may not be as difficult as imagined to identify rangeland control sites that fit the similarity criteria. In this case, the control site would likely cover a large area (e.g., an entire conventionally managed ranch) and SOC sampling plans covering that area would be needed to capture the effects of baseline management. Furthermore, where this doesn't work for a given project, there is always the model & measure quantification

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		totally impractical. Crediting based on what's happening in another space/time would add sophistication without rigor	approach 1 as an option.
26	Indigo Ag	Baseline control sites should not be allowed, this method introduces too much opportunity for gaming and was intentionally not included in VM0042 during initial drafting by Indigo and Terracarbon. Further, baselines in this methodology were designed to ensure high integrity accounting via a dynamic baseline, that is both sensitive to historic land use (e.g. historic degradation), as well as robust in accounting for market demand on and weather effects (a grower is not credited on the basis of weather fluctuations or market demand for a particular crop). Baseline control sites remove this functionality and are a step backward in terms of accounting accuracy and adaptability. Control baseline sites can be gamed to artificially increase crediting, and are also difficult to implement operationally. Any time a benchmark is matched to a site there will be an allowable parameter range for that matching. A project developer who wanted to game the system would pick a benchmark at the low end of that range to artificially boost crediting by lowering the baseline. This method of benchmarks is also operationally infeasible as a project developer would have to require monitoring and reporting of a farm that continued to implement conventional management. This results in a perverse outcome where the project locks certain fields into less sustainable management practices.	1) We believe the rigorous similarity criteria greatly reduce opportunities for gaming. Indeed feedback from the ad hoc expert group as well as other commenters is that this represents a rigorous and scientifically valid approach. The commenter doesn't provide sufficient detail for us to respond to gaming concerns. 2) We argue that actually control sites represent a dynamic baseline and are comparable to the modeled baseline under QA2. They require active baseline management throughout the project lifespan and will take into account fluctuations in weather and concomitant impacts on SOC stocks. 3) The primary parameter of concern for crediting purposes is SOC stocks. As a reminder, CDR removals in the SOC pool are calculated as the sum of the difference between SOC stocks at t and t-1 within the baseline and project scenarios. The implication is that if a lower %SOC were artificially selected that still met the threshold for linking to a sample unit, that site would simply have a lower starting SOC stock for comparison at t=5 years for example. Hence, there is no gaming concern with the %SOC similarity criterion. 4) First, the control sites will be only a fraction of the size of the areas where project activity interventions occur. Second, one control site can be linked to multiple project sites, which we fully expect. Given this, we disagree that there will be a perverse incentive to not adopt sustainable practices given that the area under project interventions will vastly outweigh the area under baseline management. 5) VM0021 was recently placed on hold by Verra (i.e., it is not available for project development while we evaluate pathways for

Q2: Are there any additional or different requirements that should be added to define and monitor Baseline Control Sites (e.g., minimum one baseline control site per stratum when a stratified soil sampling design is used)?			
#	Organization	Comment	Developer's Response
		The methodology VM0021 could be used in place of VM0042 if such baselines were needed. We provide more detail in the attached general comments.	improvement) in part precisely because it uses a static baseline which we believe has been superceded by the dynamic baseline offered in VM0042.
27	First Climate	Although the Baseline Control Site approach offers interesting opportunities, we see this as a risky approach that adds considerable uncertainty and bias to the estimated carbon sequestration. We especially want to highlight the following considerations: • It will be very difficult to find an appropriate field that represents adequate conditions for the project field site in the first place. • Unless a scientifically sound design for a field experiment is applied with a sufficient number of replicates, a control site will not improve the accuracy of the projects impact on soil carbon. • Even if management and soil properties are representative enough, the uncertainty of the carbon stock measurement will be added to the project site's uncertainty for crediting the sequestered carbon. • The effort for sampling the baseline control site would be better dedicated to an enhanced sampling scheme in the project site. • SOC baselines should be based on conservative assumptions with minimal uncertainty. • Predictive SOC baselines create a high risk of overstated baseline emissions. Consider prescribing static SOC baselines (i.e. no credits for avoided SOC losses), at least for managed agricultural lands in developed countries. This will also help to avoid double-funding with agricultural subsidies and associated additionality problems.	We agree that it may be difficult to identify control sites that meet the thresholds for linking. We agree that scientifically sound soil sampling must be conducted to facilitate statistically valid conclusions on SOC stock changes. We've added language around sampling design and number of samples. Yes, uncertainty associated with direct measurement both in control and project sites must be accounted for and deductions taken if uncertainty thresholds are exceeded. Without the baseline control site option (and an accepted performance benchmark), there is no viable direct SOC measurement option for project sites to dedicate effort towards. Hence, sufficient effort must be put towards sampling in both control and project sites. With the control sites option, there are no assumptions being made; they are established using data supporting the similarity criteria requirements. This approach requires a dynamic SOC baseline which is proposed in the form of control plots; a static baseline would render the approach incomparable to the dyanmic modeled baseline under QA1. Lastly, the control sites option indeed does allow for SOC stock change to be credited both for avoided losses (mineralization) in baseline scenario and SOC stock enhancement (removals) in the project scenario. Crucially though, this is based on observations achieved through direct measurement, not assumptions.

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		Generally we are critical towards a baseline setting approach with a predictive baseline that is also reflected in the measure remeasure approach choosing baseline control sites. In the light of the current trend of decreasing SOC stocks in agricultural fields, likely to accelerate in the context of climate change, this approach takes into account not only increases in carbon stocks compared to project start but also avoided emissions from soil carbon mineralisation. It therefore creates credits combining sinks and emission reductions.	
28	Bluesource	It is mentioned that control sites must be 'sufficiently large', the vagueness of this could be heavily manipulated. We believe there needs to be more detail devoted to how you can meet similarity criteria in regards to climate when you have no geographical proximity requirements	We have added further guidance explaining that control sites must be sufficiently large to ensure normal farm operations. However, the ad hoc expert group advised not to include fixed size given the wide variation in farming systems, e.g., monocrop soy/maise vs almond orchard vs smallholder diversified annual/perennial systems. Regarding a proximity requirement, we argue that the updated set of similarity criteria that include climate zone, native vegetation and preciptation provide a sufficient assurance of similar climate, as supported by the ad hoc expert group.
29	John Deere	We strongly agree with the addition of the measure and remeasure methodology, as it opens the opportunity for accessing carbon markets across a much wider geographic range, particularly in the tropics where a currently accepted process-based model is not available. There are several modifications and clarifications that we believe will make this methodology more useful: - Currently the methodologies are listed as heirachical, with option 1 being the best to use where a model is available with option 2 only for when a model and/or performance benchmark is not available. We believe that both methods are effective for measuring carbon	1) The commenter is referring to the two quantification approaches when they say methodologies. There is no preferential treatment of QA1 over QA2, i.e., they are not hierachical. Both are available for use at the discretion of the project proponent. 2) It is already allowed to switch between QAs during the project crediting period - this shows up in Section 8.1 in the paragraph following Table 5. In practice for the SOC pool this should work to switch from QA2 to QA1 but going the other direction would be challenging given that projects would have to identify control sites after the project was already underway. 3) We agree that leveraging existing networks of sites that can serve

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		and as such a project proponent should be able to select whichever method will make their project most effective (e.g. lowest levels of uncertainty). - As models become available in new regions, there should be a mechanism for transitioning a project from one methodology to another over the course of the project if it is beneficial for the project (e.g. lowering the cost of MRV). For example, if a project begins as a measure and remeasure project, and then over the lifetime of the project a valid model becomes available, there should be a mechanism for transitioning to a measure and model methodology. - The logistical challenges and costs of maintaining sufficient control sites is not yet clear. There is likely a large opportunity for reducing project costs if a network of control sites is publically available through an entity such as the USDA or Embrapa that new projects could be added to on a rolling basis. The methodology could leave the door open for this by making clear that new projects could be added onto existing control sites as long as sampling is conducted at the start of each new project.	as control sites would be an ideal solution for projects. In the future we may consider ways to pre-approve such networks of sites for VM42 project development but that's beyond the scope of this revision. Also, to note that the approach allows for research institutions, public entities, and others to manage control sites.
30	Climate Neutral Group	Differences in project emissions and baseline emissions, e.g., tC/ha, should be multiplied by the size of the relevant Baseline Control Site (ha) and accounted for as project emissions.	Indeed the difference between t=0 and t=1 emissions within control sites will be used to estimate baseline scenario emissions across the entire area under project management. For example, if there are 10 ha of control sites and 1000 ha of linked project sites (sample units), the delta in emissions for control sites will be upscaled to 1000 ha to estimate baseline scenario emissions. We added a sentence to section 8.5.1 to address this comment: "The average SOC stock per hectare of each "project site-baseline control site" combination should be used for the subtraction."
31	Arva Intelligence &	The identification of control sites that meaningfully reflect the hydrobiogeochemistry of the target farmlands	We argue that our updated similarity criteria and thresholds detailed in Table 7 are a robust and scientifically valid approach to using

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	UC Berkeley & Lawrence Berkeley National Laboratory	-- yet which are spatially separate from the target farmlands -- is a significant challenge. We are limited by the size of microclimates that influence temperature regimes and hydrological forcings on the crop system; the immense heterogeneity of soil ecosystems -- and soil conditions that are unique specific geographic regions, such as alluvial soils or glacial soils; the unique impacts of soil engineering (where it is practiced) that may be difficult or impossible to replicate at distal sites. Further, permitting the selection of distal control sites creates substantial moral hazard: machine learning algorithms could be deployed to identify and select sites that match -- "on paper" -- the target sites, but which are predicted to have negative, slower, or negligible carbon accumulation rates, maximizing the measured value of "additionality". This is a serious problem that many are in a position to exploit immediately. Control sites should be restricted to sub-allotments of individual project sites -- doing otherwise opens the door to market manipulation. It also concentrates the capacity to issue credits in the hands of entities with access to numerous control sites -- outside the hands of the farmer -- and it is the farmer these markets should, if we are wise, best serve. If we do not serve the farmer, participation will suffer, supply will diminish, and the goal of leveraging managed terrestrial ecosystems for carbon sequestration will not be realized. Ensuring that baseline soil strata are represented in the control site is important -- provided the strata in question contribute significantly to the total carbon budget. Small strata may be identified for some projects, e.g., due to outliers in the soil composition of the project sites, that are simply not relevant to the target project (e.g., projected to account for less than 1	baseline control sites for comparison of SOC stock changes in reference to project sites, as validated by the ad hoc expert group we convened. We do not believe that identification of control sites will be a quick and simple process. We also don't agree with the commenter's viewpoint in the second paragraph which in fact contradicts the argument in the first paragraph acknowledging the complexity of identifying control sites that match the similarith criteria. Feedback received indicates that control site identification will be a time consuming and challenging process and we do not understand how AI/ML can be leveraged to game the system when there will be relatively few control sites that have the required similarity criteria and are willing to participate in the project. We also do not agree that control sites should be restricted to sub-allotments of project sites. Other comments underscore the need for flexibility in control site selection including at externally managed sites such as research stations, in order to facilitate identification. Control sites will serve the project by providing a reference for baseline SOC stock change; and this will be achieved irrespective of the entity managing the site(s). Stratification will firstly be used across project sites to understand variability in order to identify the number and requisite similarity criteria characteristics of control sites. Thereafter prospective control sites can further be stratified for final selection based on criteria dependent on soil sampling, i.e., texture, soil order and %SOC.

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		standard error of measured carbon tonnage).	
32	Cloud Agronomics	The baseline-control method can be strengthened. We agree that baseline-control sites can be used to calculate the business-as-usual sequestration scenario against which project performance can be judged. However, we believe that the baseline-control scenario as currently described misses an opportunity for a more rigorous assessment of baseline conditions. As currently described, the baseline-control scenario is likely to (1) prevent project enrollment due to insufficient availability of baseline-control sites, and (2) cause systematic errors in crediting due to changes in the baseline that are unrelated to the project. Similar challenges have undermined forest carbon offsets in California, including the suggestion that project developers preferentially selected sites that are not epresentative of regional conditions, resulting in systematic over crediting (Badgley et al. 2022). Clearer guidance around the selection of baseline-control sites, or requiring large and statistically representative samples to be used as baseline-control conditions, as we suggest below, would help to alleviate these challenges. As the number of conditions that are required for matching project and baseline-control sites increases (e.g., as described in Table 2 of the proposed revision to VM0042), fewer opportunities will be available for baseline-control sites that can be matched to potential projects. Page 26 correctly notes that as the number of control-project pairs increases, uncertainty in change calculations for SOC stocks decreases. We believe that	Suggestion 1 is an interesting idea but beyond the scope of this revision. In the future we may consider such a study that could unpack questions related to required number of control sites. At the end of the day though, this will come down to the variability within project sites (sample units) participating in the project; low variability implies few control sites, high variability implies many control sites. Suggestion 2. We do not understand the first part of this related to an accounting based system and the mention of additionality criteria. To clarify, additionality of project activities is not assessed through control site selection/monitoring but rather through the additionality assessment described in Section 7. Furthermore, we have removed the tiering approach in the similarity criteria such that climate zone now is required to match.

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		the criteria in Table 7 on page 26 are likely to result in situations where insufficient numbers of control sites are available. We therefore suggest the following: Suggestion 1: Verra should commission a feasibility study to determine how the number of baseline-control sites for any given potential project is influenced by the criteria in Table 7 on page 26. This could be accomplished using existing geospatial information for hypothetical project scenarios in a geographic information system. For example, for a hypothetical project, how many locations exist that could potentially be sed as baseline-control sites? Suggestion 2: Change the similarity requirement from a matching-based system to an accounting-based system. As currently defined, the approach documented in Table 7 seeks to eliminate differences between project and baseline-control sites. An alternative is to quantify relationships between the factors in Table 7 (in addition to others) and SOC sequestration for projects not under management, and to use these relationships to determine how much sequestered SOC in a given project can be attributed to additionality criteria. If the accounting method described in suggestion 2 is not adopted, then among the baseline conditions that are currently described, climate zone should be Tier 1, and it should be stated that baseline scenario quantification must either (1) account for (i.e. match) short-term changes in the weather that can impact carbon sequestration or (2) require that baseline conditions are in close geographic proximity to the project. The current revision to VM0042 states on page 26 'There are no geographic proximity requirements for control sites …'	

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		This raises the possibility that baseline-control sites will be within the same climate zone but far apart geographically, and therefore that baseline-control sites may experience weather conditions that are different from sites under management. Because weather contributes to soil carbon sequestration, some changes in soil organic carbon content will be unrelated to management practices or other additionality criteria. These changes may be due to variability in temperature and precipitation that impact rates of microbial decomposition in soil and therefore contribute to the quantity of standing SOC stocks and how they are changing over time. Requiring that control sites are close (geographically) to project sites greatly reduces this risk, because sites that are close together are more likely to experience similar weather and climate conditions. This will reduce the risk that credited sequestration is spurious (i.e. the project site accumulates more carbon than the control due to differences in the weather). It will also reduce the risk of failing to detect sequestered carbon (baseline-control sites sequester more carbon than the project due to changes in the weather).	
33	Shell	The required 'baseline control' site for reference changes to SOC (which needs to be measured and re-measured over time) means that several sites must be managed in inefficient and relatively GHG-intensive ways for the entire project duration. It would be unrealistic (and poor practice) to expect farmers or landowners to maintain 'bad' practices which decrease soil carbon or increase GHG emissions.	First, the control sites will be only a fraction of the size of the areas where project activity interventions occur. Second, one control site can be linked to multiple project sites, which we fully expect. Given this, only a small area of land will be under baseline (bad) management relative to project (improved) management. We agree that there could be the need for a large number of control sites if there is high heterogeneity in the project sites with respect to

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		We recognize that the protocol does allow these control sites to be experimental research sites (and therefore not necessarily forcing one landowner to maintain the 'bad' way of doing things), but it is more likely that farmers will be the ones implementing and maintaining these sites given the factorial number of combinations that could be expected of a large project following the Table 7 categories. More generally, requiring a reference control plot for every project SOC gain location may mean that a simple project (i.e., few unique combinations of categories in Table 7) might be manageable, but depending on stratification complexity, the requirement for baseline control sites could mean unreasonable costs and be impractical to implement and maintain over the full project life.	the similarity criteria. This however does not negate the robustness of the control site approach.
34	Shell	The control plot approach seems to have some of the same risks as other methodologies using a similar approach including the potential for projects to choose reference areas/control plots that benefit them the most. Given the lack of geographic restriction, what is to prevent a project from selecting a control that is known to underperform the corresponding sample area?	We believe the rigorous similarity criteria greatly reduce opportunities for gaming and selecting sites that will underperform relative to their linked sample unit(s). Indeed feedback from the ad hoc expert group as well as other commenters is that this represents a rigorous and scientifically valid approach. Furthermore, the primary parameter of concern for crediting purposes is SOC stocks. As a reminder, CDR removals in the SOC pool are calculated as the sum of the difference between SOC stocks at t and t-1 within the baseline and project scenarios. The implication is that if a lower %SOC were artificially selected that still met the threshold for linking to a sample unit, that site would simply have a lower starting SOC stock for comparison at t=5 years for example. Hence, there is no gaming concern with the %SOC similarity criterion.
35	Shell	Similarly, there is a requirement to take "at least 3-5 composite samples within each stratum … when using quantification approach 2". At this minimum number of samples required, it is plausible that 10 samples could	The VCS tool for soil sampling and analysis will provide detailed guidance to eventually address the commenters concern. In the meantime, we believe that it is the job of the VVB to review soil sampling procedures taken by the PP and ensure adherence to best

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#	Organization	Comment	Developer's Response
		be taken and analyzed before the proponent then chooses the 3 data points that represent the biggest difference between control and project SOC, and the lowest variability. Especially given that there is no guidance on a minimum number of cores (and therefore how many go into a 'composite'), what is to stop a project from choosing the data points that will result in the most credits, not necessarily the true average?	practice as specified in the methodology. The example given in the comment would certaintly not qualify as best practice.
36	Shell	Baseline control sites are required to match the 'management activities' of the prior land use and schedule of activities. Given that there is no need for geographic proximity (and that within a single Terrestrial Ecoregion/IPCC climate zone there can be huge intra-annual variation in temperature and precipitation) between control site and project site: • What is considered the same 'schedule of activities'? For example, do planting, harvesting and fertilizer/irrigation dates have to perfectly align with project site history? If not, what is the acceptable tolerance for days different? • Similarly, what is the acceptable tolerance threshold for differences in fertilizer/irrigation application rates? • If the baseline control site is seeing abnormally high rainfall, do you still need to irrigate at the same intensity and frequency?	We have amended the historical management criterion to provide clearer guidance on how to evaluate similarity, in line with the commenters recommendations/concerns in the first and second bullets. We have also added a new criterion around precipitation. We also clarified that under adverse/abnormal conditions, deviations from the baseline schedule of activities are permitted.
37	Shell	It is hard to see why the "IPCC climate zone" and "Terrestrial Ecoregion" criteria are not essential (I.e. Tier 1 in Table 7). Without specific criteria around similar climatic factors (I.e., temperature or rainfall) or geographic proximity, these are essential to ensure the baseline and project site experience similar conditions in the actual project year and having any leeway around this seems hard to understand. Similarly, some climate	We have amended Table 7 by removing the tiering approach - now all criteria are required. Furthermore, we added a new criterion to ensure mean annual precipitation is within +/-100mm and a geographic proximity requirement of 250km.

Q2: Are there any additional or different requirements that should be added to define and monitor Baseline Control Sites (e.g., minimum one baseline control site per stratum when a stratified soil sampling design is used)?			
#	Organization	Comment	Developer's Response
		zone/ecoregion combinations are the same for 1000 miles. This means extreme weather may impact one site and not the other (e.g., hurricane force winds or wildfires).	
38	Shell	Having the percent SOC and bulk density be "within the uncertainty range" of the linked sample unit needs additional clarification. If there are only 3 samples taken, then the uncertainty bounds will likely be very large and so it makes it much easier to defend that the sites are similar. Example: at time-zero project site SOC% = 1.8±0.4 and bulk density = 1.2±0.3 for top 30cm, control site SOC% = 1.4±0.3 and bulk density = 0.9±0.2 for the top 30cm. Under this scenario, traditional non-ESM approaches would estimate the t0 SOC stock to be 65 tC/ha at the project site and 38 tC/ha at the control site. These are clearly not the same and could not be expected to have the same starting point.	First, we have removed the bulk density criterion since measurements need to be done on a ESM basis. Second, we have amended and clarified the threshold guidance on %SOC.
39	Terra Global Capital	Terra Global believes the text is clear, and Project Proponents do not need additional or different requiremnets. We question whther a 3 year look back is enough?	We have clarified that for historical management practices a 5 years lookback period is required. We also added a historical land cover criterion that requires that the control and project sites were converted from the same major land cover type within +/-10years
40	Radicle	No, the proposed situations seem to be sufficient.	Supportive comment, no response needed.

Q3: Is the separate calculation of GHG reductions and removals logical and correct?

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#	Organization	Comment	Developer's Response
41	Nutrient Management Institute	Yes. Considering the conversion factor 44/12 from the C in SOC to CO2 equivalent. If I understand correctly the conversion factor should be included in Eq. 38. DCO2_soilt is in t CO2 eq. So when SOC is converted to a unit in CO2 equivalents (DCO2_soilit), it should be multiplied with 44/12. Furthermore. The SOC unit is expressed in CO2eq. The equation for attaining the stocks is not explicitly given (BD*content). I think it would be a usefull addition. Usually pedotransfer functions are used to determine the BD but they are not mentioned anywhere in the document. Considering they're importance for SOC stock assessments it could be a usefull addition.	"We have added a general equation to calculate SOC stocks and included the conversion factor to CO2eq in eq. 37 (previously 38). After consultation with an ad hoc expert group convened as part of this revision, Verra does not recommend the use of pedotransfer functions to estimate bulk density as they are not able to capture management related changes. We added further clarifications in paragraphs 2 and 3 under sub-heading Collection of soil samples in section 8.2.1 regarding the sampling depth and required depth layers to enable following the ESM approach. We included a screenshot of the ESM spreadsheet provided by Wendt and Hauser 2013 as a new Figure 2 to further illustrate the calculation procedures. This information was verified by the authors of the paper to make sure we are providing the correct guidance. In Equation 3, we have changed the unit of SOC content from the ambiguous mass-% to g/kg and adjusted the conversion factor to 1000 for converting g/cm2 to t/ha."
42	Terra Carbon, LLC	"While separating emission reductions and removals when determining gross GHG emission reductions and removals may make sense to provide clarity between the two types of climate impacts a project may have, the distinction may not be wholly necessary, and the calculations provided to determine gross emissions reductions and removals and net emission reductions and removals appear to have some errors or missing context to explain why the distinction between removals and reductions would impact how leakage, uncertainty, and project area are applied in determining net emission reductions and removals.	Thank you for this thorough and useful comment. We have majorly revised the equations in sections 8.5 resulting in only one equation for net reductions and one for net removals, including leakage and uncertainty discounts only for the SOC pool and further uncertainty discounts for CH4 and N2O emissions from the soil when following Quantification Approach 1. The multiplication by sampling unit area was implemented in equations in sections 8.5.1.-3. We have removed the bars above the terms in equations 34-35 and corrected "areal average" to "total" in the respective parameter descriptions below the equations. Where pertinent, we added bars above terms and added the

Q3: Is the separate calculation of GHG reductions and removals logical and correct?			
#	Organization	Comment	Developer's Response
			specification "areal average" in the parameter descriptions of several equations in section 8.2. We agree that equation 41 summarizing CH4 emissions was duplicative and have removed it to ensure consistency and avoid confusion. The same is valid for former equation 46 summarizing N20 emissions. Equations 37-48 (in sections 8.5.1-3.) have been now corrected and calculate the total emission reductions/removals as the result of multiplying the areal averages per sample unit multiplied by A - Area of the sample unit i.
43	South Pole	In the current estimation guidance to differentiate between removals and reductions, it is not sufficiently clear where the project emissions area accounted for and where to deduct these from. If the project scenario leads to 1tCO2 being removed and 1 tCO2eq avoided, where would a hypothetical 1tCO2eq project activitiy emission be deducted from?	The project emissions must be deducted from each emission source using equations in sections 8.2.1-11. and 8.5.1.-3.
44	Indigo Ag	The calculations for gross GHG emissions reductions and gross GHG emissions removals (Equations 33, 34, and 35) are summing areal average emission reductions for a variety of GHG sources with units in tCO2e/unit area. However, resulting variables (estimated gross GHG emission reductions in year t and estimated gross GHG emission removals in year t) are stated as having units in tCO2e. Either their units should instead be tCO2e/unit area or both equations 33 and 34 should be multiplied by a unit of area to yield tCO2e.	Responses added to the more detailed comments in rows 156 and 157
45	Indigo Ag	The units of equations 33 and 34 do not make sense: the units of the left-hand side are tCO2e, and the units of the right-hand side are tCO2e per unit area. As a result, the equations are incorrect and need to be fixed. Looking ahead to Equation 36, which multiplies the left-hand side of equation 33 by area of the project, it appears that the intention was to	Please see response #42.

Q3: Is the separate calculation of GHG reductions and removals logical and correct?			
#	Organization	Comment	Developer's Response
		define the left-hand sides of equations 33 and 34 as having units of tCO2e per unit area. Also, in equations 33 and 34, it would be helpful to do two things: (1) explain what the subscript "g" stands for (it seems to stand for "gross"); (2) explain in words what "gross" here refers to (right now, the name of the variable is simply restated as its definition). In equation 36 (respectively, equation 37): 1) Why is the uncertainty deduction being reduced by the fraction ER_red / ER_ERR of emissions reduction coming from avoided emissions (respectively, ER_rem / ER_ERR for the fraction coming from removals)? We think the uncertainty deduction should simply be applied to the estimated total reduction of emissions, as in the CAR SEP and in v1 VM0042. 2) Why is the quantity reduced by a factor of ER_red/ERR (respectively, ER_rem/ERR)? It would be convenient to pull the factors of ER_red/ERR and ER_rem/ERR, respectively, out of the first parenthetical quantity, to simplify the expression. More importantly, however, we're confused why those fractions are in these equations. To illustrate our confusion, consider a project that avoided 100 tons, removed 100 tons, and had zero uncertainty deduction and zero leakage deduction. Equation 36 results in 50 tons (the 100 avoided tons gets reduced by a factor of ER_red/ERR = 50%), and similarly Equation 37 results in 50 tons (the 100 removed tons gets reduced by a factor of ER_rem/ERR = 50%). Then Equation 87 adds the two quantities (resulting in 50 + 50 = 100) and subtracts the buffer credits. But the desired result is 200 VCUs minus the buffer credits: there were no deductions from leakage nor	

Q3: Is the separate calculation of GHG reductions and removals logical and correct?			
#	Organization	Comment	Developer's Response
		uncertainty, so the result should've been 100 + 100 – Buffer.	
46	Indigo Ag	This issue with units in tCO2e instead of tCO2e/unit area propagates into Equations 36 and 37, which estimate net GHG emission reductions and removals, respectively. The equations multiply estimated gross GHG emission reductions in year t and estimated gross GHG emission removals in year t by a portion of the project area, which implies that the units for those estimated emission reductions and removals should be tCO2e/unit area.	In our view, slowing down SOC losses can still be considered SOC gains and thus be counted as removals compared to the counterfactual baseline of more rapid SOC loss.
47	First Climate	Units aside, Equations 36 and 37 multiply project area, leakage, and uncertainty by the proportion of reductions to total emission reductions and removals (ERRs) and the proportion of removals to ERRs, respectively. This, however, does not seem to be an appropriate approach. Neither leakage nor uncertainty are specific to reductions or removals; a single number for each is calculated for the project. There does not seem to be a clear reason for portioning the calculation out in this way. Furthermore, it is unclear why the project area is divided proportional to reductions or removals. If estimated gross reductions and removals are calculated on a per area basis, they should then be multiplied by the total project area to get estimated emissions reductions and removals for the whole project. Multiplying estimated emission reductions or removals by only a fraction of the total project will underestimate total project emission reductions and removals, even if the fractions by which each is multiplied add up to 1.	All CO2 emissions associated with SOC stock changes are classified as removals.
48	Bluesource		Verra plans to adopt the recommendations of the Integrity Council for the Voluntary Carbon Market in terms of labeling VCUs as reductions or removals.
49	Climate Neutral	We propose the following approach instead:	No response needed. Supportive comment.

Q3: Is the separate calculation of GHG reductions and removals logical and correct?			
#	Organization	Comment	Developer's Response
	Group		
50	Terra Global Capital	1. Calculate gross GHG emission reductions as the sum of areal average CO2, CH4, N2O emissions reductions multiplied by the whole project area (Ao) to get gross emissions reductions for the whole project in units of tCO2e. (Equation 33)	No response needed. Supportive comment.
51	Radicle	2. Calculate gross GHG emission removals as the sum of areal average CO2 emissions removals in soils, trees, and shrubs multiplied by the whole project area (Ao) to get gross emissions removals for the whole project in units of tCO2e. (Equation 34)	No response needed. Supportive comment.

Q4: Does the updated uncertainty section contain sufficiently detailed guidance to enable a robust calculation? Do you agree with the proposed uncertainty deduction thresholds?

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#	Organization	Comment	Developer's Response
52	Carbon Count	8.6.1.1 equation 51 allows mean calculation using only a subset of sample units but random sampling with replacement is open to gaming from re-rolls. Selecting only a subset of sample units for mean calculation can be skewed.	This equation has been eliminated. Re-rolls would not be allowed in the case that random sampling with replacement were used.
53	Nutrient Management Institute	Excellent section. Some additions. There are small typographic errors which are included in the annotated PDF. If we understand correctly,	The recommended measurement methods - equivalent soil mass sampling and use of dry combustion - are intended to reduce measurement errors to a degree that their impact

Q4: Does the updated uncertainty section contain sufficiently detailed guidance to enable a robust calculation? Do you agree with the proposed uncertainty deduction thresholds?			
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		the MC is used to also account for errors in the sampling design. (page 73). That's good. Regarding the measurement-derived uncertainty estimates, there is no detail yet on compounding errors which are either dependant ro independant. Additionally, how to propagate error when you deal with a combination of measurement based (e.g. C content from an Elemental Analyser multiplied with a bulk denisty derived from a pedotransfer function). What also could be expanded on is how variance of modelled or measured carbon, and whether it is for a single or homogenous strata. There are statistical tools such as conditione Latin Hypercube Sampling which can be used for this.	on estimation of net reductions could be considered negligible. In instances where methods with higher, non-normal measurement error are being used (e.g. soil spectroscopy) we are requiring that proponents use the Monte Carlo simulation method to propagate those errors. Additionally we've clarified guidance on the variance of modeled or measured carbon values translate into estimates of sampling error.
54	Agoro Carbon Alliance	This new chapter offers great details on how to calculate uncertainty, and is much appreciated. The deduction thresholds should ensure the integrity of the carbon credit issuance process, which we recognize as important.	Thank you for your comment. We agree that uncertainty deduction procedures are important to the integrity of credit issuance and have endeavored to base these procedures on major sources of uncertainty likely to emerge from the quantification approaches in this methodology.
55	Terra Carbon, LLC	The addition of a MCMC approach to uncertainty estimation is good, but clarification would be useful in several sections. Clarification on various methods used to generate a posterior predictive distribution for a given model scenario could be helpful for readers. References included point to papers that accomplish this task in different ways. For example, Gurung et al. 2020 is based on Bayesian calibration of the Daycent model, whereas Ogle et al. 2007 uses an empirical	Additional language has been added in this section to clarify expectations as to how the posterior predictive distribution used in the Monte Carlo simulation method should be developed to ensure this method captures model prediction error in a manner similar to the analytical error propagation method.

Q4: Does the updated uncertainty section contain sufficiently detailed guidance to enable a robust calculation? Do you agree with the proposed uncertainty deduction thresholds?			
#	Organization	Comment	Developer's Response
		uncertainty estimator that is then applied to modeled estimates. Also, Equation 65 suggests an MCMC approach that could be applied to a sample unit. Given that sample units could be variously defined in VM0042 but examples typically define them as fields, one interpretation of the MCMC approach would be to model a posterior for a sample unit based on the collection of point data within that unit. If we understand the intent of the addition of this section correctly as providing a different means to account for model structural error, the former is more consistent with that intent whereas the latter would be a misinterpretation.	
56	Terra Carbon, LLC	Additionally, guidance on the two 'pathways' for uncertainty deduction is sufficient, but we'd request additional justification for why Case N3 and Case N1 differ. Language on page 82 provides a reasonable explanation as to why electing to quantify N2O emissions via quantification approach 3 results in lower estimates of uncertainty and that corresponding adjustments in equations 83 and 85 are necessary. However, we highlight that in a project where N2O emissions are quantified using quantification approach 3 but do not constitute a substantial portion of total ERRs, an unduly high uncertainty deduction could be applied to ERRs for other sources.	Uncertainty based on the use of emissions factors in QA3 is now dealt with by requiring conservative/accurate estimation of ERRs by using the best available EF. The n1 and n3 pathways have thus been eliminated.
57	robofarm GmbH	No, in the chapter 6.6.2 there are a few unclarities in the equations, details in "General Comments"	Responses provided to the specific comments below.

Q4: Does the updated uncertainty section contain sufficiently detailed guidance to enable a robust calculation? Do you agree with the proposed uncertainty deduction thresholds?			
#	Organization	Comment	Developer's Response
58	Indigo Ag	No, the proposed changes to Section 8.6 contain mistakes, open the door to gaming, and reduce the quality of VM0042 by allowing sampling variance to be ignored. The proposed changes to uncertainty deduction thresholds are overly complex and a step backward in terms of interpretability of the credits. Section 8.6 must be overhauled before this update is adopted.	Thank you for your extensive comments on this section. We agree with many of the concerns raised and have made a variety of changes to address them. Please see the updated sections 8.6.1 and 8.6.2.
59	First Climate	There seems to be sufficient guidance for a robust uncertainty calculation. However, we don't understand yet how the variability from measurements in the measure-remeasure approach is accounted for in the uncertanty calculation and how it impacts the deduction thresholds. We therefor see a number of possible changes: (i) Instead of chosing a number of sample units - control site pairs, it would be more relevant to evaluate the variance of each sample unit. This way the sampling scheme gets automatically reflected in the uncertainty, i.e. the more individual samples are analysed per sample unit, the smaller the variance and hence uncertainty. If for any reason (costs!), only very few samples are actually analysed, the uncertainty of the estimated average carbon stock need to be reflected in the removal calculation. (ii) As described above, applying the idea of a baseline control site does in contrast artificially creates new sources of uncertainty and a	This section has been updated. The s^2-SOC term that is calculated based on the equations in 8.6.2 is what is used to calculate the uncertainty deduction for QA2. Additional language has been added in 8.6.4 to further clarify this point and figure 3 has been updated.

Q4: Does the updated uncertainty section contain sufficiently detailed guidance to enable a robust calculation? Do you agree with the proposed uncertainty deduction thresholds?			
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		considerable bias. (iii) When it comes to soil carbon sequestration, a higher uncertainty needs to be accepted in contrast to other emission reductions. If deductions are too restrictive, the projects lose viability especially in its initial phase. We therefore suggest to start with lower uncertainty requirements for initial project phases and increase these requirements with each monitoring period.	
60	John Deere	All uncertainty calculations are reported on mean SOC for the field. We suggest that the distribution of SOC should also be reported for future reference.	It is expected that in monitoring reports soil sampling results for each be point be reported. While this is not exactly the same as your suggestion, the necessary raw data would be available for characterizing distributions.
61	Arva Intelligence & UC Berkeley & Lawrence Berkeley National Laboratory	Section 8.6 is problematic. The decomposition of uncertainty into model uncertainty, data uncertainty, and measurement error is useful. However, the problem is not with the estimation of confidence bounds per se -- it is with the application of those estimates of uncertainty to values derived from models: The use of direct measurements as ""true ups"" (page 24) to modify model fits and estimates introduces unnecessary error – and almost certainly bias. As model parameters are required to be set / fitted at the scale of a single IPCC climate zone (or nationally defined agricultural land region), and must be calibrated to minimize error for multiple PCs, CFGs across spatially distant and sparse public datasets, there is risk of models	Thank you for these points. The section detailing the true-up procedure (8.6.1.3) has been updated for greater clarity. To clarify, the use of models in VM0042 is two-fold - to allow for the representation of a dynamic baseline based on continuation of BAU practices and to allow for interim crediting between measurement events. The points you raise about uncertainty estimation as outlined in this section are good ones. But the purpose of this guidance is primarily to conservatively estimate all potential sources of uncertainty so that a reduction can be applied that makes credit issuances conservative. In other words, to prevent over-issuance of credits. The true-up procedure is meant to continually update estimates of model prediction error specific to the project itself and to update project credit estimates by providing data to periodically reinitialize the model.

Q4: Does the updated uncertainty section contain sufficiently detailed guidance to enable a robust calculation? Do you agree with the proposed uncertainty deduction thresholds?			
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		over/under fitting due to insensitivity to locally important confounders not captured in the calibration sets. It would be better to take the new estimate of carbon levels as the mean of measurements. There is no guarantee these "true ups" will debias the model, particularly in regions where microclimates are maximally different relative to the average model parametrization. An accurate and responsible estimate of uncertainty is useless if it is applied symmetrically to an estimate of the mean that is far from unbiased (far from the true mean). Model predictions do not constitute statistically unbiased estimates -- they have many sources of bias and many sources of error -- and certainly have not been vetted for the majority of US farmland. Hence, the problem with section 8.6 lies primarily in its application: we suggest that all uncertainty quantification be centered on measured values – simple averages obtained from soil samples, statistically unbiased estimates of the mean carbon content of soil. Further, it seems plausible that asymmetric uncertainty will be the norm, and not the exception, and hence symmetric uncertainty intervals are likely to be problematic and misleading. The use of models may be a useful tool for interim accreditation, but it should not be a replacement for measured samples. For	

Q4: Does the updated uncertainty section contain sufficiently detailed guidance to enable a robust calculation? Do you agree with the proposed uncertainty deduction thresholds?			
#	Organization	Comment	Developer's Response
		example, Ogle et al., (2010) have shown that the uncertainty associated with SOC stock changes from 1990 to 2000 in US croplands were greater than 600% at the site scale but less than 25% during the same time period at the national scale. (Gurung et al., 2020). Abstracting away error by increasing scale is not a satisfactory replacement for accuracy, and gives an advantage to project proponents with large land holdings, and effectively bars individual farmers from participation. Additionally, the use of small calibration sets and poor spatial coverage leaves a potential confirmation crisis once better datasets are developed, which poses a substantial risk to public perception of voluntary carbon markets.	
62	Viresco Solutions	Last sentence before section 8.6.1.2. There are a number of major consequnces to the sentence if it is not removed. The uncertainty method as described for quantification method 1 is incorrect if this statement is left in. The statement also makes VMD53, that deal with validation of difference in emissions between baseline and project, inappropriate as it would need a different type of validation and model uncerrtainty estimation, one for of baseline emission only. If it is left in, it believe it should be an option only and leaving it in would require a lot of text addtion to the uncertainty section to cover this option and to VMD53 to provide	This sentence and the section it is within have been updated.

Q4: Does the updated uncertainty section contain sufficiently detailed guidance to enable a robust calculation? Do you agree with the proposed uncertainty deduction thresholds?			
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		necessary validation and model uncertainty estimate to support this option. I strongly expect in most cases this option would increase project uncertainty, so there is no need to rush into huge revisions to accomodate this option. Definitely if one just removed the model uncertainty as in the version 2.0 for the baseline as it states, the uncertainty method would be wrong. Therefore, it can't be left in as is.	
63	Radicle	"The uncertainty section as written is currently confusing. The section uses language and terms that are not defined or consistent with the rest of VM0042. For example, in Sec. 8.6.1 it states ""The lowest uncertainty is expected if all the sample units are estimated since then no uncertainty is introduced by sampling"". Does this mean that the less soil sampling conducted the lower the uncertainty? That conflicts with an earlier claim that the uncertainty decreases as the number of sample units increases earlier in the same section. Much of this section would benefit from being moved to an appendix, but also is the intent that only PhDs can run the model and calculate the uncertainty? What type of academic and professional expertise will be necessary to not only calculate the uncertainty but then	This section has been updated aiming at improving clarity and acessibility overall. While we understand that this section may come across confusing to some users, responsible estimation of uncertainty and corresponding deductions are essential to generating high integrity credits that are conservative. It has been designed to capture key sources of uncertainty and is similar to other methodologies on the VCS. Some elements have been moved to an appendix to improve readability, but we maintain that it is essential to the proper implementation of VM0042 and as such should remain in place.

Q4: Does the updated uncertainty section contain sufficiently detailed guidance to enable a robust calculation? Do you agree with the proposed uncertainty deduction thresholds?			
#	Organization	Comment	Developer's Response
		validate/verify it was done correctly?"	

Q5: Do the newly introduced criteria to evaluate the use of proximal sensing technologies to measure SOC include all important aspects or should this appendix be more detailed?

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64	Boomitra (ConserWater Technologies Inc.)	In the newly incorporated Appendix 4, we observe that for measuring soil carbon any emerging technology can be used where the "project proponents should provide evidence of the ability of an emerging technology to predict SOC content with sufficient accuracy through the development and application of adequate calibration with data obtained from classical laboratory methods, such as dry combustion". However, we also observe that in the core parts of the methodology, remote sensing is typically crossed out as an example of an emerging technology, in favor of NIR, INS and other proximal sensing methods. Assuming that the above quoted general requirements for a project proponent to provide evidence for an emerging technology can actually be met, we would like an explicit clarification that remote sensing is in fact an emerging technology that may be	A new VCS Tool is currently under development to combine physical soil sampling with a range of environmental datasets and remote sensing to estimate SOC stock changes within a project area. VM0042 v2.0 now includes a reference to this new tool.

Q5: Do the newly introduced criteria to evaluate the use of proximal sensing technologies to measure SOC include all important aspects or should this appendix be more detailed?			
#	Organization	Comment	Developer's Response
		used.	
65	Carbon Count	Note use of proximal sensing technologies may not be cheaper if the primary cost driver is labour to send someone out to collect the data.	Verra is in agreement with this comment. This is why Appendix 4 includes this passage: "proximal sensing may be more cost-efficient." We have also added a reference to this publication: Li, S., Viscarra Rossel, R. A. & Webster, R. (2022). The cost-effectiveness of reflectance spectroscopy for estimating soil organic carbon. European Journal of Soil Science, 73(1), e13202. https://doi.org/10.1111/ejs.13202
66	Nutrient Management Institute	The section is thorough, but we have an addition regarding the the Near Infrared Sensors. It would be helpful to also mention that the error asociated with the NIR should be propagated. The translation from a spectrum to soil properties is done wityh Machine or Deep learning. It can also be mentioned that these tools can not only be used for Organic Carbon, but also other soil properties such as mineralogy and bulk density. As soon as proximate and remote sensor start to fuse (in development nowadays) there is also a distinction needed for direct C stock estimation rather than only C content. Some detailed remarks are in "general comments" sheet	We have clarified that these errors need to be propagated and will require that to do so, proponents should use the Monte Carlo simulation approach and sample from a posterior predicitve distribution for each sample point. At present, direct C stock estimation using a combination of proximal and remote sensing is not an approved measurement method, but it may be under consideration in the near future. Use of such methods would be considered a deviation at present.
67	Persistence Data Mining, Inc.	New emerging technologies like hyperspectral sensing should be defined and included at a minimum 6 inch depth using a hyperspectral sensor analyzing 400-2500 nm. This should be more detailed to include wavelength measurement requirements	Hyperspectral sensing is out of the scope of this Appendix and may be covered in an upcoming VCS Tool to combine physical soil sampling with a range of environmental datasets and remote sensing to estimate SOC stock changes within a project area.

Q5: Do the newly introduced criteria to evaluate the use of proximal sensing technologies to measure SOC include all important aspects or should this appendix be more detailed?			
#	Organization	Comment	Developer's Response
		since accuracy is dependant on the bands analyzed	
68	Agoro Carbon Alliance	Appendix 4 is a great addition to the methodology. In particular, the reference to key scientific publications is of great help.	We have added a list of general information for the application of proximal sensing technologies to be included in the monitoring plan and monitoring reports. Furthermore, we have modified the requirements around spectral ranges to allow for more equipment and instruments to be used. We understand the concerns around IP rights, but also need to ensure SOC measurements are transparent so that resulting carbon credits have a high credibility. Appropriate confidentiality agreements or NDAs may be signed as necessary between service providers of certain measurements, Verra and VVBs, to enable the independent assessment of the measurement technology, the presented data and the measurement performance.
69	Terra Carbon, LLC	More details around the amount and type of information expected to be required by a VVB to approve a methodology for SOC measurement with proximal sensing would be appreciated. In particular, we have concerns about the current text being too restrictive to allow collaborations with external parties, developing their own models and having the IP rights on their products. External parties will be protective of their IP rights, which is understandable.	Commenter makes several valid points. We have added a list of general information for the application of emerging technologies to be included in the monitoring plan and monitoring reports providing further details on representativity of calibration/validation data, demonstration of accuracy, and determination of uncertainty to include in the calculations of error propagation in Section 8.6 of the methodology. In addition, we have highlighted the importance of sample homogenization and grinding before analysing samples where organic ammendments have been applied.
70	South Pole	Limitation of AI-based sample technics: We don't believe this is practical if AI based algorithm to determine similarities are used. This might therefore significantly limit the use of sophisticate technology the would	A new VCS Tool is currently under development to combine physical soil sampling with a range of environmental datasets and remote sensing to estimate SOC stock changes within a project area. VM0042 v2.0 now includes a reference to this new tool.

Q5: Do the newly introduced criteria to evaluate the use of proximal sensing technologies to measure SOC include all important aspects or should this appendix be more detailed?			
#	Organization	Comment	Developer's Response
		bring higher accuracy as conventional approaches. The following publication could help to guide selection of AI technologies: Yuzugullu, O.; Lorenz, F.; Fröhlich, P.; Liebisch, F. Understanding Fields by Remote Sensing: Soil Zoning and Property Mapping. Remote Sens. 2020, 12, 1116. Further, we recommend to provide additional clarity if AI-driven sampling approaches and machine learning driven algorithms are eligible and how these shall be included in methodology. Clarification by Hannes (17 Mar 2022): Yes, also from discussions with some technology providers, we learned that many use AI-driven approaches to selectively apply sampling on farms to not only inform carbon but general farm-advisory. While these are often more effective compared to randomized stratification, the replicability might be constrained due to the advancement of the AI- algorithms.	In addition, Verra has initiated the development of another VCS Tool focused on soil sampling, sample processing, and SOC laboratory methods. The tool will include scoping of RS methods to derive stratification which could also include AI-based approaches as the commenter suggests. We have clarified that stratified random sampling must be applied as a sampling strategy, as recommended by several experts and soil organic carbon handbooks. An alternative strategy may only be used by requesting a methodology deviation demonstrating that a different strategy is more accurate for the specific project conditions.
71	Indigo Ag	We believe the updates to Table 6 and the details of Appendix 4 provide a pathway for new advancements in measurement technology to be used with appropriate safeguards to account for potentially increased uncertainty that may come with lower-cost methods of analysis.	No response needed, supportive comment.

Q5: Do the newly introduced criteria to evaluate the use of proximal sensing technologies to measure SOC include all important aspects or should this appendix be more detailed?			
#	Organization	Comment	Developer's Response
72	First Climate	"(1):""The applicability of a selected technology to measure SOC in a project must be demonstrated in several peer-reviewed scientific articles."" We appreciate that this statement requires peer-reviewed scientific articles to demonstrate the applicability of a selected technology. However, ""several"" peer-reviewed scientific articles is vage and we would suggst that ""at least one"" is required. To require too many publications is possibly a hurdle for new technologies.	"1) We have specified the minimum number of three publications. According to the proposed updates to the VCS Program on peer-reviewed literature requirements, the publications must be in a journal indexed in the Web of Science: Science Citation Index .
73	Bluesource	While there is value in emerging technologies allowing for the collection of a greater number of samples at a lower price point, this appendix should perscribe a minimum level of accuracy or agreeance with conventional tests such as dry combustion before a new technology can be considered qualified.	We agree with the commenter and have added a general requirement to determine uncertainty compared to dry combustion results and use them for the calculation of error propagation in Section 8.6 of the methodology.
74	John Deere	We are very supportive to opening up to new measurement technologies that can lower the cost of verifying SOC. The appendix as written is sufficiently detailed for the technologies described. We also recommend providing a framework for incorporating new innovations in measurement technologies over time that can potentially reduce uncertainty and/or lower the cost.	Verra can periodically update Appendix 4 through new revisions as scientific evidence behind new technologies to accurately estimate SOC content becomes available.
75	Climate Neutral Group	Emerging measurement methods: where the previous version specifically mentioned remote sensing as an emerging	Please see the response for comment #64.

Q5: Do the newly introduced criteria to evaluate the use of proximal sensing technologies to measure SOC include all important aspects or should this appendix be more detailed?			
#	Organization	Comment	Developer's Response
		measurement method to be considered, the revised version is prescribing other innovative measurement methods (INS, LIBS, MIR, and Vis-NIR)? [Table 6 of the revised version of the methodology] Does this mean that remote sensing is no longer considered to be an acceptable measurement method?	
76	Embrapa	a) As crop residue retention belong to the main categories of practices expected to enhance SOC stocks (in some countries, mainly in tropical environment with two annual harvest sessions, the cover crop is already common practice, and it is expected that this practice will increase worldwide in the following years), it is essential to insert into the criteria and consideration to ensure robustness and reliability for direct measurement of SOC, with traditional technique or emerging technologies, a feasible removal procedure of vegetal residues before following the determination of Soil Organic Carbon content, to avoid over estimation of soil C content detected by analytical techniques. b) In Appendix 4, LIBS Criteria and consideration Table, it was suggested that the soil must be dried for at least 24h at 40C. But, if the soil is dried in air for at least 48h, all the residual moisture, especially in clay soil, is removed. Besides, the process is more environmentally friendly (energy saving) without heating, and no loss of organic	a) Please note that the sentence ""All organic material (e.g., living plants, crop residue) must be cleared from the soil surface prior to soil sampling. "" is included in the parameter table in section 9.2 under parameter SOCbsl,i,t and SOCwp,i,t. b) Verra agrees with this suggestion and has added this option to the methodology. c) We have added your recommendations for signal pre-treatment to remove interference with Al and Fe as well as the use of multivariate models for model calibration.

Q5: Do the newly introduced criteria to evaluate the use of proximal sensing technologies to measure SOC include all important aspects or should this appendix be more detailed?			
#	Organization	Comment	Developer's Response
		matter is guaranteed. c) We have worked with LIBS methods for soil analysis during the last 16 years in the Embrapa Instrumentation Center, mainly with soils from tropical and subtropical regions. Conservative management practices in these regions have been identified with higher capacity of soil carbon sequestration than others regions, as published in a metadata analysis study on no-tillage practice, recently published in the SSSAJ (Nicoloso & Rice, 2021). We observed that pre-treatment of LIBS signal to remove the interference of iron and aluminum improves quantification accuracy. The calibrations using CHN as a reference technique have good performance for all models (linear, multivariate, and reaching 92% for machine learning models) since the signal pre-treatment is done. We also tested calibration-free methods for soil samples with a success rate better than 90%. Thus, it is possible to obtain and ensure reproducible and reliable direct soil carbon measurement with LIBS.	
77	Yard Stick PBC	Appendix 4 details regarding soil spectroscopy includes some useful directional guidance such as ensuring in situ technologies consider moisture and that calibration procedures be well-documented. However it also includes many prescriptive details which we believe are prematurely and	We agree with the commenter and have added a general requirement to determine uncertainty compared to dry combustion results and use them for the calculation of error propagation in Section 8.6 of the methodology. To avoid limiting new methods and technologies, we have replaced this sentence with a requirement to report the

Q5: Do the newly introduced criteria to evaluate the use of proximal sensing technologies to measure SOC include all important aspects or should this appendix be more detailed?			
#	Organization	Comment	Developer's Response
		unhelpfully specific. For example, the 10 nm resolution and 400-2500 nm range appears to be derived substantially from technical specifications of popular spectrometers used historically in lab-based soil spectroscopy. While a wide spectral range is likely valuable in soil spectroscopy for carbon, there is no specific literature which has established that narrower resolution ranges, for example, are not capable of accurate measurement. Hence we believe this level of detail as a prescription or requirement is not justified by the literature and therefore inappropriate. (Note the specific guidance language that technologies "should" have spectral resolution of 10 nm and range of 400-2500.) The most important performance criteria for any measurement technology is that accuracy is sufficiently quantifiable to precisely estimate stock uncertainty (e.g. it has a stated/validated SOC RMSE). While comparisons to dry combustion (DC) are a likely valuable starting point for emerging alternatives, matching the accuracy of DC is not the end goal: robustly-evidenced stock uncertainty quantification, and therefore stock change quantification, is. So guidance should be aligned on requiring that accuracy	spectral range covered by the instrument applied and the actual resolution of the measurement.

Q5: Do the newly introduced criteria to evaluate the use of proximal sensing technologies to measure SOC include all important aspects or should this appendix be more detailed?			
#	Organization	Comment	Developer's Response
		be clearly quantified, rather than requiring a specific level of accuracy or other technical details such as spectral range. Alternatively, guidance could describe the expected range of field conditions against which the technology must be validated. For example SEP could specify that novel measurement technologies be demonstrated across "terrace, floodplain, and upland land types, on a range of SOC from 0-8%, with validation sites located within 100mi of the target project site."""" That is artificially specific but illustrates the general point: Describe required validation criteria, not technical specifications. Broadly speaking, measurement technologies must be able to demonstrate that the circumstances of their evaluation (e.g. a pilot, a published paper establishing some accuracy claim) should closely match the circumstances of a project in which the technology would be deployed. To use in situ spectroscopy as an example, validation data from a pilot in corn/soy in the Midwest could not defensibly be used to justify such a technology's use in a completely different context in, say, apple orchards in volcanic soils of Oregon.	

Q5: Do the newly introduced criteria to evaluate the use of proximal sensing technologies to measure SOC include all important aspects or should this appendix be more detailed?			
#	Organization	Comment	Developer's Response
78	Radicle	Yes, they seem logical and correct.	No response needed, supportive comment.

GENERAL FEEDBACK

Section 2 – Summary Description of the Methodology

Section 2 - Summary Description of the Methodology				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
79	Agoro Carbon Alliance	The text reads "Where an applicable performance benchmark exists, the baseline is equal to the performance benchmark. Where an applicable performance benchmark does not exist, the baseline scenario is measured and remeasured directly at a baseline control site linked to one or more sample units." The first sentence is confusing. If there was a performance benchmark, wouldn't it mean that we would necessarily follow approach 1? If so, why add this sentence here? If there is an option to use a performance benchmark, whilst following quantification 2, please specify what this would look like, given that the approach 2	If our understanding is correct, we would suggest to remove the first sentence. and say: "Quantification approach 2 is applicable when no applicable performance benchmark exists. The baseline scenario is measured and remeasured directly at a baseline control site liked to one or more sample units".	We have clarified throughout the methodology that under QA2, the performance benchmark (PB), where available, is optional, i.e., projects could still elect to use control sites for direct measurement of the baseline. It is still very much possible to develop a PB and use it for a VM0042 project but that would have to follow the development procedures for PBs as outlined in the VCS Methodology Requirements v4.1 Section 2.3.4.

Section 2 - Summary Description of the Methodology				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
		is called ""measure and re-measure"". What would then be modelled (with benchmark), as opposed to measure and re-measure?		
80	Indigo Ag	Baseline control sites were considered in the original drafts of VM0042. They were intentionally left out as they are 1) operationally infeasible, and 2) open a door for gaming: 1)Baseline control sites are operationally infeasible. These sites would have to continue baseline management in the future, as the baseline in VM0042 was intended to be dynamic with regard to weather, market effects, SOC stocks etc. With this dynamic baseline in mind, a single point measurement (for a given time period) of the baseline would not suffice as it would create a static baseline and not account for temporal changes in SOC stocks and trace gas emissions. To continue baseline management on a subset of farms, or a portion of the project area, would force those growers to continue with non- regenerative farming practices. This would not only be operationally detrimental (if regenerative practices result in agronomic gains, then these farmers would be penalized) but it also ignores economic factors that are likely to result in changes to crop rotations over time.		1) We disagree with the comment. Baselines will be reassessed at minimum every 10 years as required per the VCS Standard v4.2. Trace gases are not accounted for under control sites, only the SOC pool. Control sites will indeed take into account weather fluctuations since they are physical areas of land that are sampled over time. Control sites are small areas of land that not all project participants will be expected to maintain. We expect project proponents to reward operators of control sites to maintain baseline practices on these relatively small areas. a) There is only a 30-year project longevity requirement for ALM projects that include the SOC pool, not 100 years. b) PPs will be expected to employ rigorous sampling designs on control sites just as they would on project sites (sample units). We do not see a difference between the two in terms of need for rigor and sound soil science principles.

Section 2 - Summary Description of the Methodology				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
		Two specific difficulties of this approach: a) Maintaining these baseline control sites across several decades (possibly 100 years or more if needed to support permanence monitoring); and, b) Ensuring that all projects employ a rigorous experimental design (good overlap of soil, management, and other attributes; randomization; etc.). 2)Baseline control sites also open a door for gaming. Any matching of a baseline control site and a project area would require a range of matching criteria (soil characteristics such as clay content, SOC stock etc, weather, management). An unscrupulous project developer would always pick a control site at the end of this range to artificially lower the baseline and increase crediting. Specific comments: "Within the uncertainty range (i.e., not significantly different)" is not well-defined. What confidence level? If field A is 1±.2% and field B is 1.3±2%, can they be linked? More details are needed about how one should determine whether the historical practices at two locations are "reasonably similar" or not. Please provide specific		

Section 2 - Summary Description of the Methodology				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
		examples of causal inference in observational data in agriculture that could be used as starting points? Project sites without a linked control site should not be credited		
81	One Carbon World (Climit)	The new addition of measuring directly on site, if there is no applicable performance benchmark, will help getting the real values for a more accurate VCU.		Supportive comment, no response needed.
82	South Pole	3-year historic look-back period: Often there is limited historical data availabilty from farmers ""to produce annual schedule of activities (i.e., tillage, planting, harvest, and fertilization events) for each sample unit within the project area (e.g., for each field) to be repeated over the first crediting period	We propose to compensate this issue by extrapolating the missing data using a combination of the available historical data, data from peer-reviewed research specific to the country, and default values.	What the commenter suggests follows the logic of the allowed sources of information in Box 1, which are ordered from higher to lower priority. Note that in the draft v2.0 posted for public consultation, we introduced a sentence in Box 1, allowing for both qualitative and quantitative information sources to follow this hierarchy. Whenever farmers cannot provide this historical management data, regional average values derived from agricultural census data or other sources may be used.
83	Radicle	Quantification approach 1 states ""...measured initial SOC stocks.."" Is the intent that soil samples are only taken at the project's inception?	"...measured initial SOC stocks.."	Thank you for flagging this. We have clarified in section 2 and 8.1 that periodic measurements of SOC stocks are required every 5 years or less under quantification approach 1: measure and model. In addition, we have clarified in section 6 baseline scenario that baseline measurements may serve as model input data under quantification approach 1. This was previously only noted in Table 8 and parameter table in section 9.2. We added this clarification to the first paragraph of section 8.2.1, to section 8.5.1 and the parameter tables in

Section 2 - Summary Description of the Methodology				
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				section 9.2 for parameters SOCwp,i,t and SOCbsl,i,t: ""The initially measured SOC (at t=0 determined through direct measurements or (back-) modeled to t =0 from measurements collected within +/-5 years of t =0) is the same in both the baseline and project scenarios at the outset of the project (i.e., SOC_wp,i,0=SOC_bsl,i,0) when following Quantification Approach 1;
84	CIBO Technologies	The acronym ERR is not defined in either VM0042 or VMD0053.	Define ERR in both VM0042 and VMD0053.	We have written out emission reductions and removals at the first appearance of ERRs, in section 2.
85	Terra Global Capital	This description makes it sounds like Q1 measure and model only applies to using models on those GHG fluxes in soil. This should allow for models to be used for GHG in livestock or other non-soil GHG to be modeled	text reads in Quantification Approach 1 "...estimate GHG flux based on edaphic characteristics"	Table 5 clearly outlines which Quantification Approaches are allowed for which GHG sources / C stocks. The description on page 6 applies to all uses of QA1 as it lists key characteristics to base a model upon. We have clarified in section 2, under Table 1 that Quantification Approach 1 may be followed to model SOC stocks, soil methanogenesis, and use of nitrogen fertilizers and of nitrogen fixing species.
86	Terra Global Capital	In quantification 3, make it clear that other methods may be used including VSC approved modules	Text reads "Quantification Approach 3: Calculation – CO2 flux from fossil fuel combustion and N2O and CH4 fluxes, excluding CH4 flux from methanogenesis, are calculated following 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2019) using equations contained in this methodology. " but add the following to ensure that other	In order to make that change, a VCS approved module would have to be available. Verra welcomes external input in form of a concept note presenting this idea, which we would internally evaluate. Until such modules are developed we think it premature to reference them in v2.0. Rather we could issue a simple Errata & Clarification to VM0042 pointing to an applicable module upon its approval and publication.

Section 2 - Summary Description of the Methodology				
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			approaches can be used "...or using VCS approved modules including intensity-based models for livestock"	
87	4p1000	SOC stocks: it is not indicated to what depth SOC stocks are going to be measured - e	indicate depth 1m or down to the bedrock depending on the sit	We have clarified that stratified random sampling must be applied as a sampling strategy, as recommended by several experts and soil organic carbon handbooks. An alternative strategy may only be used by requesting a methodology deviation demonstrating that a different strategy is more accurate for the specific project conditions.
88	4p1000	Table 1 is not clear and not referred to	explain Table or remove	We have added reference to Table 1 in section 2.
89	Climate Neutral Group	(i.e., tillage, planting, harvest, and fertilization events)	This should remain an e.g., rather than an i.e., like these other activities like improved water management are excluded.	This sentence does not refer to project activities but to the schedule of activities for defining the baseline scenario.
90	4p1000	Any quantitative adjustment (e.g., decrease in fertilizer application rate) must exceed 5% of the preexisting-this is not understandable value to demonstrate additionality.	Please clarify	Please note that section 3.3.6 of the VCS Methodology Requirements v4.2 document states that "Specific carbon pools and GHG sources, including carbon pools and GHG sources that cause project and leakage emissions, may be deemed de minimis and do not have to be accounted for if together the omitted decrease in carbon stocks (in carbon pools) or increase in GHG emissions (from GHG sources) amounts to less than five percent of the total GHG benefit generated by the project." This is referenced in footnote 2 of page 10 of the draft VM0042 v2.0.

Section 3 – Definitions

Section 3 - Definitions				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
91	Nutrient Management Institute	definition baseline control site	just a thought that might need to be elaborated /updated. The current approach is valid for projects that has a substantial area included. We are currently working on methods to proof/show the impact of management on farm level, stimulating individual farmers to choose regenerative measures boosting SOC. Within that "spatial unit" it might be complex to define a "baseline control site" given the interaction between farm management and field properties. Is that currently a limitation of this VCS methodology or should we add a new section for use on projects with small areas (farm focussed)	We do not fully understand the comment. We expect all VM0042 projects to encompass sufficient land area to make them financially viable. Because ERRs in regen ag projects accumulate slowly, the implication is that these will be areas covering at minimum hundreds of hectares but more likely thousands or tens of thousands, to offset project development and MRV costs. As such, we do not expect that projects will be on a single farm or small area as the comment suggests. Furthermore, we clarify that there is no requirement that there are control sites for each single farm, i.e., a control site can be linked to multiple farms (sample units).
92	One Carbon World (Climit)	Baseline control site is very well defined. However, there could be different scenarios in reality that my cause a subjective interpretation of it. For example, what if the control site that has been using for a project activity is modified and the control site needs to be moved? In terms of soil orgnanic carbon it could be extremely difficult to find another control site that is equals to the first control site. At least refer to section	The methodology should specify more in detail the defintion of baseline control site or the procedure to follow when a control site is not applicable to the carbon project.	It will be up to the project proponent to ensure that control sites are maintained and monitored throughout the project lifespan, just as they will have to for project sites (sample units).

Section 3 - Definitions				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
		8.2, page 26, table 7.		
93	Terra Global Capital	Define of baseline control sites is very important and how they relate to sample unit is very important. It needs to be clear that a baseline control site could be outside of the project area. The use of the word "linked" in the definition is not clear and in the definition of sample unit it states they must be in the Project Area. In most cases they will, but it should allow for baseline control sites to be outside the Project Area.	Update definition of baseline control sites and samples units to allow the baseline control sites to be outside the Project Areas if they can meet all the requirements.	We agree with the commenter and have clarified in the definition that baseline control sites can be within or outside the designated project area.
94	Climate Neutral Group	The term agronomist is limiting and since the methodology is applicable globally can therefore cause for involvement of un-experienced stakeholders.	It is recommended to displace the word "agronomist" with "agricultural expert like soil scientist, husbandry specialist, agronomist, governmental agricultural body, etc." to overcome discrepancies in qualifications globally.	Verra agrees with expanding this definition.
95	4p1000	SOC stock need to be defined	add a definition maybe depending on purpose	We do not think that SOC stock needs to be defined. Note that the VCS Program Definitions document includes "carbon pools," "carbon stock" and "soil organic carbon".
96	Indigo Ag	This draft proposes to add a significant amount of text about sample designs in the paragraph that defines "Sample unit" on page 8. This new text allows the project boundary to be "divided into sample units that are assumed to be homogenous for the purposes of		Equations have been edited and language has been added to clarify that sampling error is a key component of overall uncertainty that must be properly estimated. We've further clarified that the expectation is that all sampling and modeling be done on a point basis to enable estimation of sampling error.

Section 3 - Definitions				
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		modelled estimates". We are concerned that allowing this assumption results in uncertainty being under-estimated (i.e., an un-conservative bias). Large pieces of land—such as fields—are not homogeneous in terms of soil attributes, emissions, nor emissions reduction. (If these sample units were homogeneous, then why is it common practice to take multiple samples in them? That is a contradiction.) Assuming that they are homogeneous ignores sampling uncertainty that arises from this within-unit heterogeneity. One way to see exactly what uncertainty is being ignored by this proposed change is Equation (7.5) in Sampling for Natural Resource Monitoring; this formula is an estimator of variance from composite sampling. The proposed edit to VM0042 essentially ignores precisely this source of uncertainty. What the proposed new language allows is to form one composite sample within each "sample unit" and ignore the associated sampling uncertainty depicted in the equation mentioned above. By allowing project developers to assume that their sample units, of arbitrary size, are homogeneous in terms of emissions and/or emissions reduction, this methodology becomes open to gaming: by choosing very large sample units, the		

Section 3 - Definitions				
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		project developer ignores a significant contribution to sampling uncertainty. We recommend that the rigor of v1 of VM0042 be retained by requiring that project developers quantify sampling variance and by forbidding them from assuming that sample units of arbitrary size are homogeneous.		
97	Climate Neutral Group	Definition of sample unit	Using different concepts, e.g., sample unit and sample field, sample point interchangeably is not recommended as it generates confusion. Proposed is to split these out into unique concepts, e.g., sample point is specifically related to modelling (true-up), and sample unit to monitoring. Hence confusing why the wording "modelling if applicable" has been added, since one does not model the sample unit but the entire field. True-up per field is performed, based on the measurement taken in the sample unit (sample point). As such, it is recommended to add the concept 'Field', defined as: "Areas that are homogenous in terms of climatic and soil characteristics, as well as baseline and project land management activities". Sample units can then be defined as: "Areas within a field, selected for the	Language has been updated to clarify use of terms throughout the methodology document and to more specifically indicate that the most granular unit is expected to be sample points. While we understand your point on introducing the term 'fields' the methodology needs to be written in a manner that it is clearly applicable to a range of project types, including those in which fields are not present (e.g. rangeland projects). Sample unit is intended to be a flexible, yet somewhat defined term, and a project could feasibly have multiple types of nested sample units. A field could be a sampling unit, or strata within a field could be a sampling unit.

Section 3 - Definitions				
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			purposes of modelled estimates including those from simple models (i.e., equations using emission factors)".	

Section 4 – Applicability Conditions

Section 4 – Applicability Conditions				
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98	Carbon Count	Biochar can increase the carbon sequestration potential in soils and is a benefical soil additive. We are seeing a lot of projects using on farm waste (e.g. wood chips from tree farms, biochar from digestate) to create biochars that can added to their fields	Biochar can be added to the project as long as it is accounted for and subtracted from the net GHG removal amount.	We agree that biochar is a soil amendment that can deliver useful agronomic benefits. We continue to have concern around potential for double counting of biochar eventually applied in VM0042 projects, as well as incomplete GHG accounting if it were to be allowed as an eligible project activity. Hence we have amended the text to allow biochar use as a soil amendment in the project area but with the requirement that the total carbon content of the biochar be substracted from the SOC stock change in the project scenario to avoid crediting biochar carbon. This is consistent with the approach taken for this emerging C removal opportunity in the Australian ERF Carbon Credits (Carbon Farming Initiative—Estimation of Soil Organic Carbon Sequestration Using Measurement and Models) Methodology Determination 2021

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				https://www.legislation.gov.au/Details/F2021L01696 -- see section 25 pgs 30-31.
99	South Pole	Exclusion of biochar to the soils: While we understand the reason to exclude biochar application from a carbon accounting perspective, we believe that it represents an option to create a more sustainble agricultural system, i.e. Schmidt et al. (2021), Joseph et al. (2021). With the application, other climate benefits have been proven and documented in the literature and excluding biochar generally from this methodology would disencourage the future utilization of this practice. The ucpoming biochar methodology purely focuses on the removal potential and therefore might only represent an issue under approach 2 (measure/remeasure)	We propose to allow for the application of biochar at least under approach 1 and 3. Where soil samples are taken (approach 2), it might make sense to exclude biochar or require an exclusion of the respective biochar volume from any other carbon project (i.e. under the upcoming biochar methodology) instead. This way the sink potential would be accounted under VM0042 and not under the purely removal-focused biochar methodology.	We agree that biochar is a soil amendment that can deliver useful agronomic benefits. We continue to have concern around potential for double counting of biochar eventually applied in VM0042 projects, as well as incomplete GHG accounting if it were to be allowed as an eligible project activity. Hence we have amended the text to allow biochar use as a soil amendment in the project area but with the requirement that the total carbon content of the biochar be substracted from the SOC stock change in the project scenario to avoid crediting biochar carbon. This is consistent with the approach taken for this emerging C removal opportunity in the Australian ERF Carbon Credits (Carbon Farming Initiative—Estimation of Soil Organic Carbon Sequestration Using Measurement and Models) Methodology Determination 2021 https://www.legislation.gov.au/Details/F2021L01696 -- see section 25 pgs 30-31.. Because there is a measurement requirement to "true up" measured and modeled results under QA1, we believe that the biochar carbon still needs to be subtracted from the measured SOC stocks to avoid over-estimating SOC stock change due to presence of biochar carbon. Lastly QA3 is not allowd for the SOC pool and so is not relevant.
100	Indigo Ag	While we understand the instinct to		We agree that applying two methodologies on

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		pull biochar from VM42 and direct users to use the new biochar methodology in a modular fashion, we feel that this approach places an undue burden on large, grouped projects where significant systems must be constructed for compliance with VM42. Applying multiple, overlapping methodologies on a large scale project would present undue burdens given the existing complexity of implementing VM42. For this reason, we recommend not changing the text regarding biochar from Version 1.0.		the same project lands for different activites could be burdensome. However, we continue to have concern around potential for double counting of biochar eventually applied in VM0042 projects, as well as incomplete GHG accounting if it were to be allowed as an eligible project activity. Hence we have amended the text to allow biochar use as a soil amendment in the project area but with the requirement that the total carbon content of the biochar be substracted from the SOC stock change in the project scenario to avoid crediting biochar carbon. This is consistent with the approach taken for this emerging C removal opportunity in the Australian ERF Carbon Credits (Carbon Farming Initiative—Estimation of Soil Organic Carbon Sequestration Using Measurement and Models) Methodology Determination 2021 https://www.legislation.gov.au/Details/F2021L01696 -- see section 25 pgs 30-31..
101	First Climate	We would not genereally exclude projects using biochar, since some projects may use small amounts of biochar to improve soil fertility or reduce nitrous oxide emissions without a major impact on soil carbon from added biochars black carbon. Possibly larger amounts of biochar can have positive effects on non-black carbon increase in soil that the project just needs to account for.	- The project activity cannot include application of biochar as soil amendment if more than 0.1 t stable biochar carbon per year and hectare is applied. - Alternatively, if larger amounts of biochar are applied, the amount of black carbon applied needs to be discounted from the SOC increase measured in the field, especially if biochar carbon credits are issued independently. - Savety and quality requirements	We agree that biochar is a soil amendment that can deliver useful agronomic benefits. We continue to have concern around potential for double counting of biochar eventually applied in VM0042 projects, as well as incomplete GHG accounting if it were to be allowed as an eligible project activity. Hence we have amended the text to allow biochar use as a soil amendment in the project area but with the requirement that the total carbon content of the biochar be substracted from the SOC stock change in the project scenario to avoid crediting biochar carbon, as the commenter

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			from other standards (i.e. European Biochar Certificate) may be imposed .	suggested. This is consistent with the approach taken for this emerging C removal opportunity in the Australian ERF Carbon Credits (Carbon Farming Initiative—Estimation of Soil Organic Carbon Sequestration Using Measurement and Models) Methodology Determination 2021 https://www.legislation.gov.au/Details/F2021L01696 -- see section 25 pgs 30-31.. For simplicity, we did not include a cutoff in terms of volumes applied as the commenter suggested -- we believe any application of biochar should be accounted and subtracted. Finally, because biochar is still not an eligible project activity we do not agree that safety/quality requirements should be imposed as that would introduce undue burdens on project proponents to demonstrate compliance.
102	Climate Neutral Group	What is the rationale for excluding biochar?		The rationale to exclude biochar was due to potential for double counting and incomplete GHG accounting of biochar.
103	One Carbon World (Climit)	About the exclusion of the application of biochar, it is understood that there is a specific methodology for that activity in Verra, however, it is still an agricultural regenerative practice. The exclusion of this will result in a challange to project developer who will need to apply two different methologies in one project activity (and one PD) if biochar is used as a set of new	Include biochar as a possible ALM activity	Please see response to comment #100.

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		agricultural regenerative practices introduced to a field. In the same way, Verra does also have a methodology to account for emission reductions through N fertilizer rate reduction (VM0022) but the VM0042 is not referring to that methology when fertilizer rates are reduced as a part of regenerative agricultural practices under the VM0042 methodology.		
104	Shell	The methodology revision specifically states, "The project activity cannot include application of biochar as a soil amendment", citing that the project should instead use the new VCS biochar protocol. The way this is worded reads as though you cannot apply biochar to the project, regardless of whether you want to claim credits from the biochar impact. The issue is that the current VCS biochar methodology isn't designed to capture the impacts of biochar in terms of agronomic benefit, so any added sequestration wouldn't fit under any protocol if it's removed from VM0042. Furthermore, if a project developer wanted to test biochar on an existing project site, even if they do not want to claim credits, this wording effectively removes biochar R&D opportunities		We agree that biochar is a soil amendment that can deliver useful agronomic benefits. However, we continue to have concern around potential for double counting of biochar eventually applied in VM0042 projects, as well as incomplete GHG accounting if it were to be allowed as an eligible project activity. Hence we have amended the text to allow biochar use as a soil amendment in the project area but with the requirement that the total carbon content of the biochar be substracted from the SOC stock change in the project scenario to avoid crediting biochar carbon. This is consistent with the approach taken for this emerging C removal opportunity in the Australian ERF Carbon Credits (Carbon Farming Initiative—Estimation of Soil Organic Carbon Sequestration Using Measurement and Models) Methodology Determination 2021 https://www.legislation.gov.au/Details/F2021L01696 -- see section 25 pgs 30-31..

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		from those new/existing projects.		This change would allow for projects to capture any potential negative priming or other synergistic effects that biochar may have on SOC stocks, or to apply biochar in an R&D context, as the commenter suggests.
105	Bluesource	The definition of wetland is too broad and could be interpreted to disqualify traditionally cropped acres.	Include a definition of wetland that clearly excludes small pockets of occasionally flooded land within traditionally seeded fields.	The definition of Wetland given in the VCS Program Definitions should satisfactorily address the concern.
106	Nutrient Management Institute	reduce fertilizer	adding organic fertilizers (as defined earlier) is actually contributing to SOC build-up. Should this not be distinghuished here, or made more specific (lowering excessive inputs down to agronomic optimum ones?)	Commenter makes a valid point. Changed "reduce" to "improve fertilizer (organic or inorganic) application" in Section 4 and App1
107	Agoro Carbon Alliance	VM0042 accounts only for fertilizer rate reductions. However, Agoro Carbon believes that reductions of emissions can also be gained by introducing improved practices such as: -Better fertilizer placement to reduce fertilizer losses -Change to enhanced efficiency fertilizer products to reduce GHG emissions -Better management of fertilizer application timing to improve fertilizer uptake by the crops	Agoro Carbon will like to incorporate the mentioned practices in VM0042 methodology. If such revision can be made, we will be happy to work with VERRA closely on this and provide more information to VERRA on possible approach(es).	Agreed. Changed reduce to improve in App1. Added "Optimized fertilizer application (e.g., 4Rs of right source, rate, time, and placement)" which covers the practices commenter requests

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		We have described this to VERRA during our previous communication, and were expecting to see this incorporated in the methodology revision, as communicated by VERRA. However, we are missing changes in the methodology addressing this subject.		
108	4p1000	The project activity cannot occur on a wetland- does this include drained peatlands used for agriculture? Or only natural peatlands?	it should be specified if only natural wetlands or potenial wetlands are meant	Per the VCS Program Definitions, wetlands include peatlands. Further per Applicabilith Condition 3, "the project area must not have been cleared of native ecosystems within the 10-year period prior to the project start date." Thus, natural peatlands drained for ag within 10 years would be ineligible.
109	robofarm GmbH	Account for soil pH value adjustments (e.g. liming)	IPCC Volume 4 11.3 is explicitly about CO2 emissions from liming. We should account for it in this methodology.	We agree with the commenter that lime addition can be an important source of CO2 emissions that should be accounted for if significant. We added this requirement in the appropriate sections of the methodology.
110	One Carbon World (Climit)	Considering that land use change to forestry is not permitted considering the applicability conditions for VM0042, there is a need to clarify the definition for improved agroforestry. For instance, should the project developer apply the national definition of agroforestry where the project is located? In case there is not, what would be the canopy cover		Commenter should look at and follow the the VCS Program Definition for Forest to determine whether the proposed agroforestry system qualifies as land use change from crop/grassland to forest. No change needed

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		to consider agroforestry or forestry within VM0042? How tall should trees get at maturity? Could any species of trees be considered agroforestry (native vs exotic)?		
111	One Carbon World (Climit)	"Improve crop planting and harvesting (e.g., improved agroforestry..." What does improved agroforestry means? Could that be part of the glossary? It is understood that grassland or cropland cannot be changed to forest land use, but there are some cases that the introduction of tree plants in a grassland system without reaching the forest land definition, could be call agroforestry (and there is not land use change). What if a project developer wants to implement a silvipastural system as part of an improvement agricultural land management? Could it be selected? Or does only the "improvement" of existing agroforestry system applies? In that case, what is exactly "improvement"?		Commenter raises a useful question. Because the primary activities within VM0042 are focused on crop/grassland/livestock, and not trees, we have removed the somewhat confusing mention of "improved agroforestry". VM0042 does allow for quantification of woody biomass via the CDM Tool. Other methodologies, specifically the soon to be released VCS ARR methodology will contain agroforestry-specific guidance. We also added indicative agroforestry practices in Appendix 1.
112	One Carbon World (Climit)	Increase efficiency in the use of resources (such as fuels) (e.g. agriculture precision). The implementation of agriculture precision in agriculture practices will result in the improvement of efficiency in the use of soil	Adding agriculture precision as an agricultural management.	We agree that precision agriculture -- a broad term to denote the use of high-technology and large volumes of data to inform agricultural management decisions at fine scales -- can and will be used in the context of VM0042 projects. However, precision agriculture is an umbrella term and is not a

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		properties, reduction of fossil fuels, chemicals and fertilizers and also resulting in an increase in crop yields. Agriculture precision is defined by the National Research Council as "the application of modern information technologies to provide, process and analyze multisource data of high spatial and temporal resolution for decision making and operations in the management of crop production". Agriculture precision should be considered as an agricultural managment, the reasons are: -Earth Observation, which is an example of one of the source data of high spatial and temporal resolution, facilitates the decision related to agriculture (e.g. type of fertilizer and quantity) for the farmers to take. It is also a tool that can be used to take decisions in land elegibility towards the VM0042 methodology and VCS standard. Common practice analysis could be done by the use of earth oobservation methods, simplifying work and performing a more cost-effective solution. -The connection to online platforms helps keep on track and monitor the fields, and also provides a historical lookback that can help making		single specific practice that is implemented on-farm to build SOC stocks and/or reduce GHG emissions. Precision agriculture could be used to implement one or more indicative practices listed in App Condition 1 and Appendix 1. No changed needed

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		decisions. -Technologies such as drones and robotics helps monitoring the crop system without burning fuels.		
113	Terra Global Capital	This requirement at the practice (which is can be quantified) must be more than 5% is unclear. Does this mean that if the only change if the amount of some input used (but the input is the same) it must be a change of greater that 5%. Why place this limit, or if you must, make it clear that it would apply to things like change in fert application method, or change in seeding practice, or change on length of harvesting height. While Table 4 makes it clear which are quantitative and qualitative, but it still seems like requiring 5% change is not necessary for applicability and will be limiting and unclear.	test states "Any quantitative adjustment (e.g., decrease in fertilizer application rate) must exceed 5% of the pre-existing value., which should be calculated as the average value over the historical look-back period developed for the baseline schedule of activities (see Section 6 Baseline Scenario). remove or provide more details. Since this is in the applicability section it must be 100% since you cannot have a deviation to applicability criteria.	For practices that involve quantitative values such as fertilizer application rates, depth of tillage, etc. (listed in Table 4) it is important to have a minimum change that triggers the eligibility of the practice for inclusion in a project. The 5% threshold is important for VVBs to be able to make a determination of practice switch. No change needed
114	One Carbon World (Climit)	The fact that this was added makes it a lot easier for farmers who are interested in VCU to join the project. Mainly because most farmers have an integrated crop rotation and the fact that the VM0042 would not permit the change of grassland to cropland and vice versa made it not possible for them to join without changing their production system.		1. We propose that a one-time conversion be restricted to the second type of allowed land use change focused on reversing degradation. We added the following red text into the second bullet of Applicability condition 2: "A one-time conversion from grassland to cropland or vice versa …" and into the third paragraph of Appendix 2: "This exception allows for a one-time conversion from grassland to cropland or vice versa and

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		This implementation was great.		requires.." For the first type of allowed land use change focused on converting temporary grassland into cropland using Integrated Crop-Livestock Systems and related management systems, we believe the conversion could happen more than once and still deliver positive benefits, i.e., annual crops could be reintroduced into a grassland system that was initially incorporated into degraded cropland. This the crux of these highly integrated and holistic ICL systems that essentially maximize synergies between animals and plants – see for example Peterson, et al., 2020 (https://doi.org/10.1371/journal.pone.0231840) or Sekaran, et al., 2021 (https://doi.org/10.1016/j.jafr.2021.100190). The details for this would be outlined in the required long-term management plan for the system which could be verified by the VVB and outside expertise as needed. 2. We agree that international studies may not be relevant if not conducted under similar conditions as in the proposed project region. We reached out to numerous experts who have published in the area of land degradation and restoration including Dr Leigh Ann Winowiecki, Dr Annette Cowie, Dr Pete Smith, Dr Sarah Wolff and Dr Hans-Peter Liniger. Drs Smith and Cowie (who published this meta-analysis on practices that combat land degradation in GCB,

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				https://doi.org/10.1111/gcb.14878, and this framework for reversing land degradation in Env Sci & Pol, https://doi.org/10.1016/j.envsci.2017.10.011, respectively) responded. Both expressed support for the overall approach described in Appendix 2 and noted the importance of allowing LUC to enable restoration. They further noted that international studies can be applicable where they pertain to similar soil types, environments and interventions, and suggested some additional evidence types. Based on this we modified the text so that the relevant sentences now read "Evidence types may include local expert analysis and relevant local, regional, or national studies. Where those are not available, international studies conducted under similar biophysical and climatic conditions and with comparable management practices may be used. Evidence may further include quantification of recognized indicators of degradation by direct measurement, proximal or remote sensing, and/or modelling."
115	One Carbon World (Climit)	In "Introduction of temporary grassland into cropland is allowed where it can be credibly demonstrated prior to project validation that the integration of perennial crops (e.g., grasses, legumes) into annual crops is planned as part of a long-term	Modify the sentnces to contemplate other possible scenarios	Please see response to comment #114.

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		agricultural management system (i.e.g., Integrated Crop-Livestock". Despite the introduction is very well wellcome, there is a need to include also "...integration of annual and perennial crops (e.g. grasses, legumes)..." In other words, temporary grasslands can also be an annual crop (Lolium multiflorum)		
116	Terra Global Capital	The requirement to allow for conversion from grassland to cropland prior to the project validation is unclear. As this is the project activity (i.e. implement a bunch of activities on degraded grasslands to covert to croplands) and this does not happen BEFORE validation these are the project actions. In addition, in grouped projects, they will be coming into the program at each verification and thus they need to demonstrate then their conversion was allowable.	text states "• Conversion from grassland to cropland or vice versa where it can be credibly demonstrated prior to project validation that project lands in the baseline scenario are degraded and the introduction of improved practices involving land use change would lead to significant improvements in soil health and associated socioenvironmental benefits. " but this needs to be made clear that this is the project action and that for grouped projects it is before they enter the program. You should change the definition to say, "distraite prior to Project Start (not Project validation)" and for grouped projects demonstrate when at the first monitoring period they are added to the Project.	Commenter makes a good point. Changed from validation to start date and added a clause around new activity instances also needing to demonstrate degradation. We propose that a one-time conversion be restricted to the second type of allowed land use change focused on reversing degradation. We added the following red text into the second bullet of Applicability condition 2: "A one-time conversion from grassland to cropland or vice versa ..." and into the third paragraph of Appendix 2: "This exception allows for a one-time conversion from grassland to cropland or vice versa and requires.." For the first type of allowed land use change focused on converting temporary grassland into cropland using Integrated Crop-Livestock Systems and related management systems, we believe the conversion could happen more than once and still deliver positive benefits, i.e., annual crops could be reintroduced into a grassland system that was initially incorporated into degraded

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				cropland. This the crux of these highly integrated and holistic ICL systems that essentially maximize synergies between animals and plants – see for example Peterson, et al., 2020 (https://doi.org/10.1371/journal.pone.0231840) or Sekaran, et al., 2021 (https://doi.org/10.1016/j.jafr.2021.100190). The details for this would be outlined in the required long-term management plan for the system which could be verified by the VVB and outside expertise as needed. We agree that international studies may not be relevant if not conducted under similar conditions as in the proposed project region. We reached out to numerous experts who have published in the area of land degradation and restoration including Dr Leigh Ann Winowiecki, Dr Annette Cowie, Dr Pete Smith, Dr Sarah Wolff and Dr Hans-Peter Liniger. Drs Smith and Cowie (who published this meta-analysis on practices that combat land degradation in GCB, https://doi.org/10.1111/gcb.14878, and this framework for reversing land degradation in Env Sci & Pol, https://doi.org/10.1016/j.envsci.2017.10.011, respectively) responded. Both expressed support for the overall approach described in Appendix 2 and noted the importance of allowing LUC to enable restoration. They further noted that international studies can be applicable where they pertain to similar

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				soil types, environments and interventions, and suggested some additional evidence types. Based on this we modified the text so that the relevant sentences now read "Evidence types may include local expert analysis and relevant local, regional, or national studies. Where those are not available, international studies conducted under similar biophysical and climatic conditions and with comparable management practices may be used. Evidence may further include quantification of recognized indicators of degradation by direct measurement, proximal or remote sensing, and/or modelling.""
117	Radicle	Footnote 2 indicates that the threshold for emissions that can be considered de minimis is 5%, however the footnote corresponds to a requirement that productivity not be reduced by more than 5%. I'm not sure that this footnote applies to this requirement.		This footnote has been deleted.
118	Terra Carbon, LLC	For clarity, it could be helpful to ensure the applicability conditions for the model, specifically the bullet detailing that the model must be publicly available, match those outlined in VMD0053.	Consider adding proposed text from VMD0053 to VM0042 explaining the publicly available applicability condition to ensure clarity and consistency: "Publicly-available, though not necessarily free of charge, from a reputable and recognized source (e.g., the model developer's	The referred text is now the same in VM0042 and VMD053.

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			website, IPCC or government agency). Sufficient conceptual documentation of inputs, outputs, and information of how the model functionally represents SOC dynamics must be accessible to the public. Providing the source code or an API for independent replication of calculations is not necessary;"	
119	Radicle	Model conditions require that the same version of the model must be used beween the baseline and project scenarios. This may be problematic if the project developer is not the model owner and is using a web-based version. Or older versions of the model are no longer supported midway into a crediting period.	Provide clarity on what steps should be taken if a version change of the model is necessary.	This guidance is provided in VMD0053, section 2, 3 and 4.
120	4p1000	Any quantitative adjustment (e.g., decrease in fertilizer application rate) must exceed 5% of the pre-existing value - where does this number come from?	add a justification	Please see response to comment #90.

Section 5 – Project Boundary

Section 5 – Project Boundary				
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121	4p1000	CDM A/R is not explained	indicate somewhere what is meant by CDM A/R	We wrote out Clean Development Mechanism at the first appearance of CDM.
122	4p1000	What is ALM?	should be clarified	ALM is agricultural land management. It is already written out in its first appearance on pg 5.
123	One Carbon World (Climit)	Table 2: "Aboveground and belowground woody biomass must be included where project activities may significantly reduce the pool compared to the baseline." It should also say that woody biomass must also be included where the project activity includes agroforestry practices"	Include "aboveground and belowground biomass must when agroforestry practices are included".	It will be in the project proponent's interest to include the woody AGBM pool if there are expected to be signficant increases in tree stocks, but there is no requirement to do so. The pool remains optional, no change needed.
124	4p1000	Why is CO2 following biomass burning excluded when other emissions are S*?	Consider to include also biomass burning CO2 as S*	CO2 is excluded, but decreases of biomass carbon stocks following burning must be included where relevant.
125	One Carbon World (Climit)	"... may be deemed de minimis and may be ignored..." It is agreed that this is a good approach to facilite project activities. However, it should be considered that the summatory of ignored sources of emissions or reduction or decreases in carbon stocks do not overpass that 5% threshold. This is a normal procedure for example under ISO standards	Include a clause that considers the summatory of ignored sources of emissions do not overpass certain threshold.	We do not see a discrepancy between the approach described by the commenter and the rules of VM0042. Note that all references to de minimis demonstration are conducted via application of CDM A/R methodological Tool for testing significance of GHG emissions in A/R CDM project activities In addition, 3.3.6 of the VCS Methodology Requirements document v4.1 states that specific carbon pools and GHG sources,

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				including carbon pools and GHG sources that cause project and leakage emissions, may be deemed de minimis and do not have to be accounted for if together the omitted decrease in carbon stocks (in carbon pools) or increase in GHG emissions (from GHG sources) amounts to less than five percent of the total GHG benefit generated by the project. We have added the term "sum of increases in GHG emissions" to clarify this issue to section 5.

Section 6 – Baseline Scenario

Section 6 – Baseline Scenario				
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126	4p1000	Grazing practices should be Grassland harvesting practices, as also mowing can be considered.	Change 'Grazing practices' to 'Grassland harvesting practices'; Mowing frequency should also be indicated; add Harvesting (Y/N)	Agree with the commenter and added quantitative and qualitative specifications for grazing harvest.
127	Terra Global Capital	In the livestock section add feed type	To ensure the enteric from feed can be included, add in the requirements for livestock "feed type" if capturing GHG emissions	We have clarified the preference of information sources when using (default) emission factors in section 8.3 under Quantification Approach 3 and in the

Section 6 – Baseline Scenario				
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			changes from enteric fermentation	respective parameter tables under section 9.1. Including more precise information on the feed type may be part of a Tier 2 emission factor calculation. The commenter is encouraged to study the VM0041 methodology for the reduction of enteric methane emissions from ruminants through the use of feed ingredients.
128	Nutrient Management Institute	Table 4	Is crop yield not more important than length of growing period (given the long term dynamics of SOC)?	We added crop yield to the column specifying quantitative data requirements in Table 4 under *Crop Planting and Harvesting*.

Section 7 - Additionality

Section 7 - Additionality				
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129	Carbon Count	The common practice test isn't well defined beyond a "greater than 20% adoption" threshold and lacks any units of analysis. This threshold prevents broader adoption of regenerative practices since only early adopters may meet the 20% threshold and	An alternative measure of additionality could be measurement of baseline prior to changes in practice and limiting to a specific set of allowed practices. Permitting historical records to be used as baseline may also be	We believe the common practice test is well defined with a procedure and equations provided to assess % adoption which is the unit of analysis. We disagree with the statement that only early adopters may meet the threshold.

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		substituting the region definitions for stratum doesn't clarify this point further. We acknowledge this references the UNFCC however the CDM only contains an example of "unit cost of capacity or output is considered different if the costs differ by at least 20%" and doesn't have a 20% adoption threshold. The CDM is also not intended for land-based approaches and is meant for technology adoption.	justifiable if sufficient data is available to justify previous carbon stocks.	Rather in a region/stratum where <20% of all agricultural operations have adopted the practice, it will be eligible for participation in the project. Any farm/field that has already implemented the practice (i.e., early adopters) even if it is eligible per the common practice test cannot quantify ERRs associated with the practice since it is not introduced as part ofe the project. The allowance to use other forms of stratification beyond geopolitical boundaries offers flexibility to project proponents while maintaining integrity of the approach. The CDM common practice tool concludes with clause 18 "The proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2..." in other words 20%.
130	Klim - Carbon Farmed Solutions GmbH	20 % adoption rate	Increase the allowed average adoption rate, as with growoing success of the climate project, the average adoption rate will also increase. This can prevent landowners from participating in teh future	We believe 20% is a credible threshold based on established guidance in the CDM common practice tool. Most regenerative ag practices have lower than 20% penetration in many regions of the world, and there is ample room therefore to meet the common practice threshold. Increasing the threshold would be a disadvantage to other GHG sectors/methodologies which maintain the 20% common practice threshold. In the future we may consider increasing the threshold once we have a body of evidence that demonstrates barriers to project development based on the threshold being

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				too low.
131	Grow Indigo Private Limited	Common practice threshold should be upto 50%: For the demonstration of additionality, the ALM methodology requires that the project activities are not common practice, where common practice is defined as greater than 20% adoption. If the activity penetration rate of an improved agricultural practice is above 20% but below 50% in the project area, the activity does not qualify as additional. We believe the threshold of 20% for activity penetration is too low, and it should be more like 50%. Having a common practice threshold lower than 50% might actually be a disservice for climate stewardship, if it leads to lesser program penetration and lack of incentives for farmers to adopt regenerative practices. As there are proper checks and balances in the methodology for quantification, monitoring, and verification of the ERRs, a high threshold (50% adoption) for common practice, will not risk crediting existing practices that are already quite common by any conventional measure.	Increase the common practice threshold to 50% for a practice change.	Please see response to comment #130.
132	John Deere	We believe that setting the limit for additionality at 20% is not appropriate	Common practice is defined as greater than 50% adoption	Please see response to comment #130.

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		given the historical rate of adoption of new technology in agriculuture. The high barriers to adoption, including high equipment costs, long equipment lifetimes, contractural barriers in farm leases, and deep seated social norms create conditions that are not likely to result in there being a "tipping point' for practice adoption. Historical practice adoption of precision agriculture techniques with strong economic benefits have taken over a decade to reach even 40-50% adoption (e.g. Griffin, Terry & Yeager, Elizabeth. (2019). How quickly do farmers adopt technology? A duration analysis. 843-849. 10.3920/978-90-8686-888-9_104.), and many of these do not require nearly the level of risk or disruption to operations as conservation practices such as cover cropping and no till. Considering the high per-farm barriers to change and that the methodology also includes a requirement to demonstrate that the project would not move forward without the credit payment, we recommend increasing the adoption limit for additionality to at least 50%.		
133	Climate Neutral Group	"providing an estimate of the adoption rate for purposes of the weighted average calculation"	The word 'estimate' gives room for interpretation and subjectivity, it is recommended to make this more specific such as "providing an	We understand that the word 'estimate' is open to subjectivity. However we argue that the proposed change around 'providing an opinion...' is just as open to subjectivity.

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			opinion of the project activity being below a certain adoption rate threshold in the specified region'.	Furthermore, anY estimate (i.e., a concrete % value) is needed for the purposes of the weighted average calculation. The requirement that the estimate be a signed and dated attestation from a qualified independent local expert reduces risks around the estimate being gamed.
134	One Carbon World (Climit)	"Common practice is defined as greater than 20% adoption". What will happen in the (near) future when the proposed improved agricultural land management becomes more common due to the increase of carbon projects seeking carbon credits? The activity could become common practice?	The methodology should specify at certain point that it could be demonstrated that an activity is not a common pracitce even the adoption rate is higher 20%, explained by the fact that this activity has been implemented to seek carbon credits or specifically to capture and retain carbon.	Appendix 3 provides procedures for assessing whether new project activity instances are common practice based on the project or other external forces increasing activity penetration over time.
135	Terra Global Capital	On the footnote 14 here, it states that "14 The suite of activities refers to all activities implemented across the aggregated project. It does not refer to the activities implemented on each individual farm. ' Does this mean if you have a number of farmers that are implementing a suite of activities together that when taken together are not common practice, but if you have one farmer is for example is doing no-till and no-till alone would be considered common practices, this farmer (and his farm) are additionality. I do not think this is ok. the additionality test would be at the farm	text states..."The project proponent must determine whether the proposed project activity or suite of activities14 are common practice in each region included within the project spatial boundary. "	As stated in the footnote and described in Step 2, common practice is determined at the level of the stratum (e.g., state/province) established by the project, not at the individual farm/field (i.e., activity instance). We disagree that additionality should be determined at the individual farm level; the weighted average adoption equations describe how to determine common practice across the suite of activities included in the project. We invite the commenter to read through the entire Step 2 which outlines the procedures in detail.

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		level.		
136	Terra Global Capital	Reference in the footnote is confusing whether you are just showing that you used the 20% threshold or whether somehow this tool should be applied, which is not possible	text states "Common practice is defined as greater than 20% adoption.[8]"	The tool does not need to be applied; rather it is just referenced to show the precedent of the 20% threshold. We agree that there is room for clarification and made changes to footnote 14.
137	Terra Global Capital	Measure weight average adoption over project region requires a clear definition of project region, otherwise this would be gamed. Did not see a clear definition of how project region must be defined	add clear definition of project region	The first paragraph on pg 19 provides procedures for stratification of the project area and proposed v2.0 edits clarify that different forms of stratification including geopolitical, soil types, or cropping zones may be used with justification
138	Radicle	Regarding the requirement for additionality demonstration - 20% of adoption. We believe that the methodology could include more detailed definitions of each practice. For example, if we look for "no-till" adoption in Brazil, considering our national datasets, many States will easily exceed the 20% rate. However, there are scientific papers indicating that proper "no-till" practices are not really in place, what means that the public data is not representing actual practices in the country. With clearer definitions, these situations would be more easily discussed by project proponents.		As stated in the methodology, "the highest quality available evidence source...must be used" for project activity adoption rates. Using the example provided by the commenter, they could argue that the scientific papers are the higher quality evidence source. Furthermore, it is stated "Categories of project activities for the demonstration of common practice may be defined according to the categories in the evidence provided..." which indicates that the project proponent can provide evidence on disaggregated practice categories. That said, we agree that more specific categories could be provided and we amended the text to point to revised Appendix 1 which include a longer non-exhauastive list of potential

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				project activities.
139	Terra Carbon, LLC	There may be a typo in the sentence reading, "Where evidence on the suite of proposed activities is not available, a qualified independent local expert may provide a signed and dated attestation statement stating that the proposed project activity is not common practice in the region."	Consider replacing: "...stating that the proprosed project activity is not common practices..." with "...stating that the proposed suite of project activities is not common practice..."	Corrected.
140	Terra Global Capital	For grouped project it needs to be made clear that they are tested based on new adoption data when they come into the project.	Text states "For registered projects with an initial set of project activity instances, Appendix 3 lays out a recommended process for assessing whether new project activity instances are common practice. "change to say "'For registered Grouped Projects..."	Verra agrees with adding this clarification.

Section 8 – Quantification of GHG Emissions and Removals

Section 8 – Quantification of GHG Emissions and Removals				
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141	4p1000	more than one approach may be used '- not clear - does the	please clarify	We agree with the comment and have clarified the text to indicate that more

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		mean that more than one should be used if there are more available, or a minimum of one must be used		than one approach can be used at the project level but each sample unit must use the same approach for project/baseline scenarios.
142	Terra Carbon, LLC	Regarding use of Quantification Approach 2, VM0042 says, ""Relevant where models are unavailable or have not yet been validated or parameterized," which implies Quantification Approach 2 can only be used where Quantification Approach 1 cannot. However, it may be the case that a project proponent wants to use an emerging technology, such as proximal sensing or remote sensing, to develop a project in an area where a model is technically validated and available. Given the evolving nature of software as a service companies that can provide modeling services to potential project proponents--and the highly technical expertise required to run a model in-house--Verra may want to consider revising this language to allow for projects to use	Consider clarifying the language regarding the applicability and relevancy of Quantification Approach 2 to all projects, not just those in a location without a valid and available model.	Commenter makes a valid point, we agree that QA2 should be applicable to any project proponent desiring to use direct measurement for SOC irrespective of model availability.

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		direct measurement or other technologies even if a model is available so that the opportunity to develop a project is available to a broader pool of potential project proponents and project proponents are not limited to using a very small subset of commercial model providers.		
143	First Climate	We strongly recommend the option for a hybrid quantification approach allowing the combination of action-based and result-based quantification of carbon removals. The ideal approach should guarantee some credits issuance for farmers, while incentivicing measurement efforts to show additional carbon sequestration achievments to the conservative modelling estimate.	Consider allowing a hybrid approach to quantification of SOC increases, as follows: (i) to apply conservative calculation factors / modelling approaches for each new farming practice applied, yielding a basic, action-based removal potential, and (ii) to measure actual SOC increases for each monitoring period. Where additional increases compared to (i) result from (ii) they would be awarded as credits. In the opposite case, no discounts should apply to the amount of credits determined pursuant to (i), at least during the first crediting period. The hybrid approach would incentivize farmers to measure SOC and claim credits on a results basis, while ensuring a minimum carbon revenue. It would help projects bridge the critical initial years when uncertainties of measurements are relatively high due to unfavourable signal-to-noise ratios.	We understand the need for early and transition finance to adopt improved ALM practices. A hybrid approach as proposed in this comment is not allowed in VM0042 because this is an outcomes- not practice-based methodology. VM0042 does not allow project proponents to quantify SOC using Quantification Approach 3 because there is insufficient scientific consensus around the credibility and accuracy of using default values to quantify SOC. Furthermore, VCUs are only issued based on actual verified SOC stock change. Verra is creating so-called Projected Carbon Units (PCUs) to enable projects to secure early investment and benefit credit buyers by catalyzing credit supply, reducing contracting and delivery risks, building market liquidity, and facilitating transactions. PCUs could be issued at project registration and would enable

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				projects to transact units prior to the verification of ERRs and issuance of Verified Carbon Units (VCUs). After a public consultation mid-2022, PCUs are tentatively planned to become available in Q3 of 2022.
144	Gaiago	A question : If there is a climatic event that leads to SOC variations in control sites, how should the baseline be accounted for ?	If there is not yet an answer to that, possible alternative solutions could be to model the baseline when severe climatic event impact control sites.	The commenter raises a valid point that localized weather events such as droughts or floods could impact SOC stock change independent of project interventions. We have therefore included a maximum distance requirement of 250km between control and project sites which based on expert input was deemed to be a reasonable threshold.
145	South Pole	Control site size: We understand to allow for flexibility in establishing control sites, which are reflected in the similarity criteria. However, an absolute lower area boundary would be well received to provide clarity and guide project proponents in reserving land. Further, number of samples per field should be defined to ensure that these are sufficiently represented.	Propose a minimal size for control sites	We have added further guidance explaining that control sites must be sufficiently large to ensure normal farm operations. However, the ad hoc expert group advised not to include fixed size given the wide variation in farming systems, e.g., monocrop soy/maise vs almond orchard vs smallholder diversified annual/perennial systems. We have also added further guidance with respect to stratification and pointed to new resources on number of samples to collect. Finally, a new VCS tool for soil sampling, processing and analysis will soon be under development and will provide much more detail.

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146	South Pole	Establishment of control sites: In the absence of a fixed set of control sites, the reliance on control sites represents a risk to projects. Further, it represents a preverse incentive for the farmers on the control sites not to adopt sustainability practices. Areas used for research and academia might be a relevant source for comparison, which could be speficied in the methodology as a data source.		First, the control sites will be only a fraction of the size of the areas where project activity interventions occur. Second, one control site can be linked to multiple project sites, which we fully expect. Given this, we disagree that there will be a perverse incentive to not adopt sustainable practices given that the area under project interventions will vastly outweigh the area under baseline management. Lastly, we agree that sites managed by government agencies or academia for research or other purposes could be ideal control sites and indeed this is already mentioned in the paragraph preceding Table 7.
147	robofarm GmbH	How many control sites are required? "Finally, under this approach at least two control sites are required" - Is it two control sites per sample unit, per stratum, or for the entire project? We assume it is overall but the meaning is not perfectly clear to us.	Please clarify what the "at least two" criterion refers to.	At least two refers to the entire project, not per stratum. Note, that this has been changed to at least three, per the recommendation of the ad hoc expert group.
148	robofarm GmbH	Combinatorial explosion of choosing criteria for control sites. "aspect within 30° of the cardinal direction" is too restrictive. This means that overall we would already at	Make it "aspect within 45°".	We have modified this to only require aspect within 30deg for the 3 steeper slope classes in the slope classification system in Appendix 5. That said, for these steeper slope classes, cardinal direction can have a strong influence on biomass

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		least have 6 "classes" of control sites as well. Please consider that the control site similarity criteria easily leads to a state explosion, resulting in thousands to tens of thousands of possible combinations. For example, with five soil slope classes, 6 aspect classes, 12 USDA soil classification types, e.g. 3 SOC% classes, 3 bulk density classes, we already get 3240 possible combinations. And this is not even considering how the land is managed, and other properties.		growth and SOC stocks; as such, for these we are leaving it as within 30deg -- this still represents an ample range of 60deg.
149	Indigo Ag	We see these matching criteria as particularly problematic. Matching the Implemented ex post per schedule of activities in the baseline scenario; prior to project start date has reasonably similar historical management for, at minimum, the historical look-back period applied to produce the annual schedule of baseline activities. We believe this practice will create an unrealistic network of control plots that will take		We agree that there was too much room for interpretation with respect to the historical management activity thresholds and have overhauled that in Table 7. We have also removed the tiering approach to similarity criteria. Lastly, it may be challenging to identify fields that can serve as control sites for linking to project sites but we believe the basis for the approach is scientifically sound and rigorous.

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		away the nuance of this methodology, and also "reasonably similar" is pretty vague. A couple specific callouts: Seems like the burden for a grower would be vastly increased to prove Tier 1 and 2 thresholds (I assume before or when they enter data) Seems very difficult and unlikely that a grower will even have fields that meet those thresholds. They would essentially be a controlled research study.		
150	Bluesource	Requiring "Reasonably similar management activities" is left entirely up to interpretation. Similarly, Tier 2 criteria allow "slight deviations" while Tier 3 criteria allow "differences with justification". There should be some quantitative measure to evaluate whether these criteria are met.	> Identify management practises which must be consistent between control plot and linked fields. We propose crop type, tillage frequency, cover crop usage, presence of irrigation as these categories. > Create a threshold of similarity to clarify the difference between "slight deviation" and "differences with justification". We would propose a slight deviation contain no more than a 10% difference.	We have removed the tiering approach; all criteria are now required. We have amended the threshold guidance for the historical management criterion to include more straighforward yes/no alignment. We included some of the suggested management categories but not all, based on recommendations from the ad hoc expert group.
151		The text notes that weather stations need to be within	Could the distance be increased to 75km or	This is listed in Table 6 and no revision was proposed. The reference to weather

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		50km of the sample field. We are in the process of developing a grouped project across an entire province in South Africa that has very few existing weather stations. The cost of weather stations to the project will be considerable, however, we do recognise the importance of accurate and appropriate weather data.	100km?	stations pertains to modeling not baseline control sites. In this case the project proponent could request a methodology deviation and justify how weather patterns across a distance of 75km or 100km are consistent with those at 50km.
152	Climate Neutral Group	"Average soil texture in the same USDA soil textural class as the average soil texture of linked sample unit"	This should be extended with global soil texture classes / biomes to facilitate projects in other countries.	We agree with the commenter and added a reference to the FAO resource on soil texture classification which in fact uses the same scheme as the USDA
153	Climate Neutral Group	Measurements must be taken at the closest weather station .. What is the rationale that the weather station must be within 50 km from the field?	Due to differences in geology (e.g., mountainous / seaside areas), the closest weather station is not always the most accurate since at times a weather station that is further than the closest has got more similar climatic conditions due to e.g., elevation etc. Recommended to change closest into the most appropriate based on e.g., altitude.	Please see response to comment #151.
154	Terra Global Capital	Specifying Average soil texture in the same USDA soil textural class could be limiting, what about other classifications		Please see response to comment #152.
155	Radicle	Please define "not		We have amended the criterion to clarify

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		significantly different".		"Not significantly from the mean % SOC of linked sample unit at 90% confidence level"
156	Terra Carbon, LLC	In all three quantification approaches within VM0042, baseline scenarios are developed using a 3+ year lookback period on participating farms to establish a fixed schedule of activities that is then used in perpetuity throughout the project period. We suggest that this approach does not reflect how farmers make cropping and management decisions in practice and as such may fail to accurately reflect activities that would have occurred in the absence of the project. For example, a corn-soy farmer may choose to grow soy in a year that otherwise would have been a corn year in the baseline scenario due to a late winter that shortens the growing season. If a project chooses to monitor annually using their model of choice under Quantification Approach 1 and emissions factors under Quantification Approach 3,	Verra may want to consider allowing or requiring a more dynamic baseline approach in VM0042, such as the Climate Action Reserve's Soil Enrichment Protocol blended baseline approach. When a farmer deviates from their baseline crop rotation and the baseline scenario and project scenario commodity crops no longer match in a given year, then from that point on, the project switches to a blended baseline, which is essentially an annual average of the modeled emissions produced by the full baseline schedule of activities over the baseline period. It may also make sense to apply a blended baseline approach to sources covered under Quantification Approach 3, such as fertilizer, for which rates vary drastically between corn years and soy years.	We agree that assuming that the historical baseline repeats into the future without deviation may be an inaccurate depiction of reality. We further agree that allowing a blended baseline approach could help address this issue. We note though the potentially significant updates and complexity needed to incorporate a blended baseline -- see for example Appendix E in the CAR Soil Enrichment Protocol https://www.climateactionreserve.org/wp-content/uploads/2022/06/Soil-Enrichment-Protocol-V_1.1-final.pdf. We therefore intend to scope and incorporate a blended baseline in a future revision and in the meantime allow individual projects to propose these via methodology deviations which should be allowed per the VCS rules since a blended baseline relates to monitoring/measurement and will not negatively impact GHG quantification -- see VCS Standard Section 3.18.

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		then the model would simulate a corn year for the baseline while modeling soy growth and management practices for the project scenario, resulting in an under- or over-credit in that year. Furthermore, it's more than likely that in a true 'business as usual' scenario, a farmer would have made a similar cropping choice given real-world weather constraints. While such anomalies may all average out over the life of the project, they could create high variability in the accuracy of issued credits each year, which can have additional implications for project-level finances as well as farmer-level payments. The same potential issue is relevant in Quantification Approach 2 wherein a schedule of activities at control site is held regardless of whether or not it reflects a choice that would be made under realistic constraints.		
157	4p1000	no information is provided on how to measure bulk density	addmethology for bulk density determination and	Added information and a reference to ISO 11272:2017 (Soil quality — Determination

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		and to what depth SOC should be determined	give depth to which SOC should be determined	of dry bulk density) to parameter table in section 9.2, parameter SOCwp,i,t. This section included already in v1.0 the requirement to measure SOC down to 30cm. This information has now been moved to section 8.2.1
158	robofarm GmbH	Typo in equation? Nex_l unit is kgN/(100kg animal weight * year, see page 102) but equation 24 does not take average weight into account and instead treats Nex_l as if it was a measure per head. This needs to be added just like it is added for manure computation in equation 8.	Take average weight into account in equation 25.	We have corrected the unit of Nex_l,P to "kg N deposited/head/year."
159	South Pole	Approach 2: Benchmark development: Machine learning algorithm might be more accurrate due to their ability to take more aspects into consideration and are thus much more powerful then comparing areas to an existing set of reference areas. The benchmark for SOC stocks could be modelled or indicated using regional averages, i.e. aligned with the scale used for the additionality test for	Allow for the development of performance benchmarks under approach 2.	A performance benchmark is still a possibility and is not precluded by the inclusion of the baseline control sites option under QA2. According to section 2.3.4 of the VCS Methodology Requirements v4.1, static performance bechmarks "are based on an analysis of the current distribution of performance within an activity class. The methodology uses this analysis to establish the level (in tCO2e) of the performance benchmark metric (as defined per Section 2.3.9) for projects to use as the crediting and/or additionality benchmark for the duration of the project crediting period [...]"

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		practices. Using existing and approved models, such as RothC and others, the drivers for SOC in the baseline scenario can be implemented. Potential data sources for this could include: - Autodetection of crop cycles - Autodetection of crops - Regional biomass production (if stable C in soil stable) - Regional soil cover (if stable soil C stable – in combination with biomass production) In the current version, the required focus on control sites without allowing for a performance benchmark in the absence of approval criteria or guidance from VERRA represents a severe restriction to approach 2. A key criteria could be added that the removals from SOC stocks shall only be accounted if derived from increases in the project scenario (excluding degradation in the benchmark).		In the context of VM0042, a performance benchmark for SOC would provide the SOC status (stock and trend) of a certain agricultural system, in a certain region, with certain biophysical characteristics including soil type. A project area would be able to measure and re-measure SOC stocks over time and derive credits compared to the SOC stocks in the performance benchmark. The development of a performance benchmark for VM0042 may be proposed externally through a future revision of the methodology.

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160	Indigo Ag	We believe the updates to Table 6 and the details of Appendix 4 provide a pathway for new advancements in measurement technology to be used with appropriate safeguards to account for potentially increased uncertainty that may come with lower-cost methods of analysis.		No response needed, supportive comment.
161	Terra Global Capital	Ensure that in-field measurement technologies for soil can be used.	text states "...Directly measured via conventional analytical laboratory methods, e.g., dry combustion" but it is not clear whether this would include some of the new in field measurement technologies, these should be allowed.	Note that the use of in-field measurements for SOC contents are addressed in Appendix 4.
162	Radicle	Emerging technologies for soil sampling & analysis are not clearly defined until App. 4 but referenced throughout the body of the document.	Please include a definition or description of the following acronyms upon first use: INS, LIBS, MIR and Vis-NIR.	Verra agrees with this suggestion. We have added INS, LIBS, MIR, NIR and Vis-NIR to the list of defitions in section three. In addition, we have elaborated on the allowed approaches for SOC estimation/measurement in section 8.2.1.
163	Geotree	Recent studies demonstrated significant results in the determination of SOC and other critical soil variables via remote sensing (RS) technologies. RS tools are	Consider the use of remote sensing technologies for determining initial SOC content and bulk density (at t =0) in QA 1 & 2 if the SOC prediction model is calibrated with data from laboratory methods (e.g. SOC survey databases, soil sample collection) and an acceptable uncertainty range is	Please see response to comment #64.

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		capable of generating integrated estimates of the statistical distribution of soil carbon at field level consistent with empirical work, where errors at pixel-level can be reduced to an insignificant level if estimates are integrated, averaged, over larger areas. Further improvements in the prediction accuracy of these technologies are expected due to the increasing availability and improving quality of hyper- and multispectral data, and advancements in data analytics. Remotely derived measurements may be particularly adequate for Quantification Approach (QA) 1 where SOC dynamics are modeled over time and bias in initial values largely cancels out in data analyzed between two time steps. From a cost perspective, RS represents the most economically viable form of covering extensive areas in a repeated and transparent	achieved.	

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		manner.		
164	Geotree	Remotely derived spectral signatures from state-of-the-art satellites contain multiple spectral bands for an accurate differentiation and characterization of soil and other critical aspects, such as agricultural management practices, land use/cover, anomaly detection, asset performance, and biodiversity. By classifying the variation observed in data within an RS image pixel, control and experimental plots can be easily assigned. The use of spectral signatures for linking control and project plots will be a particularly useful monitoring alternative for C pools and GHG sources (e.g., woody biomass, nitrogen methanogenesis) for which the similarity criteria for SOC (Table 7) does not apply.	In QA 2, the use of RS spectral signatures (acquired over several time steps) for linking baseline control sites with treatment plots may be regarded as a robust alternative to the current similarity criteria checklist (Table 7). The spectral bands assigned to the pixels in plots shall be selected to reflect the field data requirements of historic practices and the biochemical characteristics of the targeted C pool or GHG sources (e.g. SOC content).	We agree with the commenter that RS spectral signatures could be used for certain similarity criteria to determine baseline control sites location, such as slope, native vegetation, and possibly past management activities. However, we do not plan to introduce alternative RS-derived similarity criteria because the science is still evolving and requires further validation. A new VCS Tool is currently under development to combine physical soil sampling with a range of environmental datasets and remote sensing to estimate SOC stock changes within a project area. VM0042 v2.0 now includes a reference to this new tool. This tool may support selection of baseline control sites in the future.
165	4p1000	no information how to assess stone content	provide method how to assess stone content	Agreed. Added information to the new section summarizing requirements for SOC stock measurements.. Further

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				guidance will be provided in an upcoming VCS Tool for sampling, sample processing and SOC analysis.
166	ICRAF	Soil Organic Carbon Stocks	Add a new quantification approach (Approach 3) that uses cumulative soil mass (CM), which is part of the LDSF methodology. This approach is more robust than the use of bulk density. Publications where it has been used include: 1. Vågen, T.-G., Winowiecki, L.A., 2013. Mapping of soil organic carbon stocks for spatially explicit assessments of climate change mitigation potential. Environmental Research Letters 8, 015011. https://doi.org/10.1088/1748-9326/8/1/015011 2. Winowiecki, L., Vågen, T.-G., Huising, J., 2016. Effects of land cover on ecosystem services in Tanzania: A spatial assessment of soil organic carbon. Geoderma 263, 274–283. https://doi.org/10.1016/j.geoderma.2015.03.010	After consulting 5 independent experts, Verra comes to the conclusion that requiring SOC stock changes to be reported on an ESM basis is the most scientifically robust and widely recognized approach.
167	Nutrient Management Institute	For many SOC stock assessments, bulk density is going to be crucial. I expect many studies will rely on pedotransfer functions. As far as I could see there is not a section on them. It may be useful to outline a section with the key paths to determine BD (field-based, pedotransfer, NIR). Since soil compaction is undesirable, and a simple way to increase		After consulting 4 independent experts, Verra does not recommend the use of pedotransfer functions to estimate bulk density as they are not able to capture management related changes.

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		densities, this need some additional thoughts on the inclusion of either measured or fixed values (actual or potential density).		
168	Agrorobotica	To ensure that changes in SOC stocks do not solely arise from a temporal change in bulk density (related to management practices), SOC stock changes should be calculated on an equivalent soil mass (ESM) basis.	As described in several scientific references, an equivalent mass correction may be performed using the equivalent soil mass, sampled from a native non-anthropogenic area next to the production area. This native area may give us a stable and good temporal reference for long term projects. Aline Segnini et al. Sci. Agric. v.76, n.1, p.33-40, January/February 2019. DOI: http://dx.doi.org/10.1590/1678-992X-2017-0131 Sisti et al. / Soil & Tillage Research 76 (2004) 39–58. Ellert, B.H.; Bettany, J.R.. Calculation of organic matter and nutrients stored in soils under contrasting management regimes. Canadian journal of soil science. ISSN : 0008-4271. 1995.	No response needed. Supporting comment for introducing a requirement to report SOC stock changes on an ESM basis.
169	Indigo Ag	We find section 8.2.1, addition of ESM soil sampling requirements to contradict tables 6 and 8 as they currently also mention dry combustion. The requirements in this section should be added to parameter tables for SOCwp,i,t=0, and referenced		Table 6 and 8 list model inputs, which are relevant for data feeding into models when using quantification approach 1. The requirement to report SOC stock changes on an ESM basis is only valid for quantification approach 2 and the measurement component of quantification approach 1. Depth increment is a commonly used

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		in tables 6 and 8. The language around SOC mass in this section is confusing, specifically in regards to units: The SOC mass of each depth layer [kg of C from a sample taken with surface area of cm^2 and depth of cm] or increment per unit area [what on earth is an "increment"? and by saying per unit area, this is now X/cm^2] which is not equivalent to the "or" statement] is calculated as the product of soil mass and OC concentration [kg * % = kg], where soil mass [kg] is the division of the dry sample mass in each depth layer [kg] by the area sampled by the probe or auger [cm^2]. kg does not equal kg/cm^2. It is confusing to say "soil mass" when one means the areal-average soil mass at a certain depth layer.		term in soil science peer-reviewed papers and refers to a depth interval of the soil profile. We added further clarifications in paragraphs 2 and 3 under sub-heading Collection of soil samples in section 8.2.1 regarding the sampling depth and required depth layers to enable following the ESM approach. We included a screenshot of the ESM spreadsheet provided by Wendt and Hause 2013 as a new Figure 2 to further illustrate the calculation procedures. This information was verified by the authors of the paper to make sure we are providing the correct guidance. In Equation 3, we have changed the unit of SOC content from the ambiguous mass-% to g/kg and adjusted the conversion factor to 1000 for converting g/cm2 to t/ha.
170	Indigo Ag	We are supportive of the new language requiring ESM in sampling done in the project however the methodology		The unit mm refers to the diameter D, we have edited the parameter description of equation 3 to avoid confusion with the cross sectional area of the probe or

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		should be clear and consistent that this is the required method. We have two suggestions in equation 3 on page 30: The units of the cross-sectional area should be millimeters squared, not millimeters n is not defined		auger. We have added the definition for n.
171	4p1000	correction for stone content is missing	provide a procedure how to correct for stone content	We have added a general equation to calculate SOC stocks and have provided guidance to the correction for stone content/coarse fraction when determining bulk density.
172	CIBO Technologies		Remove comma from after f(SOC	Corrected.
173	Climate Neutral Group		Clearly distinguish different monitoring requirement for the differen QAs, which currently are all combined in the same table (QA1 model-based; QA1 measurement-based; QA2 Baseline Control Site-based)	We have made several edits to the SOC parameters in the tables in section 9.2 for a clearer distinction: QA1: Ƒ(SOCbsl,i,t-1) QA1 and 2: SOCbsl,i,t ; SOCbsl,i,t-1 ; SOCwp,i,t ; SOCwp,i,t-1 In addition, we added a new subsection with general requirements for SOC stock measurements to section 8.2.1 with the relevant content that was previously in the parameter tables.

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				We added this clarification to the first paragraph of section 8.2.1, to section 8.5.1 and the parameter tables in section 9.2 for parameters SOCwp,i,t and SOCbsl,i,t: "The initially measured SOC (at t=0 determined through direct measurements or (back-) modeled to t =0 from measurements collected within +/-5 years of t =0) is the same in both the baseline and project scenarios at the outset of the project (i.e., SOC_wp,i,0=SOC_bsl,i,0) when following Quantification Approach 1; "
174	Climate Neutral Group	Refer comment earlier; make more clear distinction / clarification between model-based and measurement-based Quantification Approach 1.		We have restructured section 8.2.1 moving content up from the parameter tables to clarify. We added this clarification to the first paragraph of section 8.2.1, to section 8.5.1 and the parameter tables in section 9.2 for parameters SOCwp,i,t and SOCbsl,i,t: "The initially measured SOC (at t=0 determined through direct measurements or (back-) modeled to t =0 from measurements collected within +/-5 years of t =0) is the same in both the baseline and project scenarios at the outset of the project (i.e., SOC_wp,i,0=SOC_bsl,i,0) when following Quantification Approach 1; "
175	Radicle	Why are you multiplying by 10000 in eq. 3?	Include the explanation for the inclusion of 10,000 in the "Where:" section.	Reference is provided for this equation (Wendt and Hauser, 2013). The multiplication by 10 000 serves to match

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				the units properly.
176	Nutrient Management Institute	requirement for peer-reviewed publication	I would make this optional (or a pre) but not a requirement. This because publication is not a proof that the method is reliable, accurate and precise. I've seen too much papers on sensing technologies that are wrongly validated, overfitted or even make mistakes in data preparation. better is to focus on the minimum requirements to fulfill minimum requirements for accuracy/precision and validation methods that need to be followed.	The requirement that a selected technology to measure SOC in a project must be demonstrated in peer-reviewed scientific articles is a minimum requirement. Further method-specific criteria to ensure robustness and reliability of SOC measurement technologies are listed in Appendix 4, Table 9. The appendix also lists information which must be included in the monitoring plan and reports where emerging technologies are applied.
177	Terra Carbon, LLC	The addition of language and guidance permitting the use of proximal sensing tools is a valuable addition to the protocol as such tools may help projects achieve efficiency at large scales. Remote sensing tools also present a valuable emerging option for use in agricultural carbon projects, particularly when paired with direct sampling methods for robust validation.	We suggest that Verra consider including guidance in this set of revisions specific to the use of such tools, potentially in Appendix 4 or begin the development of a tool or module for validation of such tools that would be compatible with upcoming version of VM0042 following these revisions.	Please see response to comment #64.
178	robofarm GmbH	CH4 emissions from enteric fermentation should be measured throughout the	Clarify why enteric fermentation emissions are only accounted for during grazing days or change	We have updated the equations to quantify methane from enteric fermentation, eliminating the parameter

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		year. In equation 7 we compute the GHG emissions from enteric fermentation but only for the days when the cows are grazing. Imagine a farmer increases the grazing days of their livestock from 200 to 300 days. According to equation 7 and equation 40 this would increase our GHG emissions and the farmer would be punished drastically as enteric fermentation make the majority of emissions when calculated with verra methodology. This means when farmers stop grazing and house their animals all year round (grazing days = 0) they are getting rewarded for it.	equation to cover the entire year.	"grazing days" and pointing to the disaggregated factors of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories with a differentiation by productivity system. Reference to tables 10.10 and 10.11 are included in the section 9.1 under parameter EFent,l . Furthermore, Verra welcomes proposals for future methodology revisions to enable a more precise accounting of livestock related emissions.
179	One Carbon World (Climit)	EF ent. Enteric emission factor for livestock type l; kg CH4/(head * year). The methodology is consideting the same equation 7 to estimate emissions in baseline and project. The EF (in page 93) states that source of data may be peer-reviewed published data, for example IPCC 2019.	Would it be possible to introduce in the methodology the possibility of consideing a tier 2 or tier 3 method to estimate, as part of the monitoring, a project specific emission factor for enteric fermentation?	We have clarified the preference of information sources when using (default) emission factors in section 8.3 under Quantification Approach 3 and in the respective parameter tables under section 9.1

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		However, it is not clear if a project developer can consider a EF based on its own estimation using IPCC 2019 and applying a tier 2 or tier 3. With that, the project developer can measure emissions reductions in its livestock due to the introduction of practices that are project related: better feedstock, more available drinking water, better genetics or management practices.		
180	Terra Global Capital	It should be made clear in this section, that if one of the project activities includes improved grazing and/or feed changes, that result in an increase in stocking rates, that an VCS approved intensity-based quantification module may be applied.	Add the statement about use of intensity based VCS modules when activities include improved grazing and/or feed for livestock.	Please see response to comment #86.
181	Terra Global Capital	CH4 from enteric fermentation, when livestock management practices will be implemented as part of a crop/livestock integrated system, CH4 emission will increase if measured on the current GHG accounting	Terra proposes the development of a tool that would be applied to measure GHG emissions reductions from enteric using an intensity-based quantification approach for practices which convert degraded pastures (baseline) to Integrated Crop and Livestock Systems (proposed project activities). This tool, which could be used along with other applicable approved VCS	As stated in the VCS Program Guide document v4.2, section 2.3, "the scope of the VCS Program covers all those activities related to the generation of GHG emission reductions and removals [...]" On this basis, Verra must always ensure that project activities result in reducing GHG emissions and increasing GHG removals.

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		methods, that are based on the number of total animals on the farm. Thus, it will not properly capture the carbon potential of this kind of system, nor could the emissions could conservatively be omitted. Thus, it would be necessary to apply an intensity-based quantification approach for livestock-based emissions which would be measured on per unit of output (such as tCO2 per kg of live weight).	methodologies, would measured livestock-based emissions from enteric on a per unit of output basis (such as tCO2 per kg of live weight). This will allow projects that adopt livestock practices where there will be more heads per farm under the project scenario from those in the baseline, but the emissions (CH4-enteric) per head and kg of livestock are lower to generate credits.	In the case of projects that include livestock production systems, it needs to be ensured that emissions resulting from enteric fermentation and manure management do not outweigh the benefits of a soil organic carbon stock increase through adjusted stocking rates to reduce land pressure or increase productivity. We acknowledge that certain project scenarios may have lower absolute GHG emissions than its counterfactual baseline scenario, even when livestock head numbers increase in the project area. However, it is crucial for the integrity of the VCS program to demonstrate that emission reductions are real. Therefore, the requirements to enable a thorough comparison of the project and the baseline scenario must be very rigorous. We think that an emission intensity approach is an interesting solution for sustainable intensification that we would like to explore further beyond the scope of this revision. Verra remains open to proposals for future methodology revisions that expand the guidelines to account for livestock emissions and including an emissions-intensity approach, e.g., using economic models to demonstrate the emission reduction effects of project activities showing that intensification does not lead to higher absolute emissions due to increased production and falling dairy and meat

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				prices.
182	robofarm GmbH	CH4 emissions from manure deposition should be calculated based on all manure on the farm. In equation 7 we compute the GHG emissions from manure deposition but only for the days when the cows are grazing. Imagine a farmer increases the grazing days of their livestock from 200 to 300 days. According to equation 7 and equation 40 this would increase our GHG emissions and the farmer would be punished for what is considered a more sustainable farming practice. This means when farmers stop grazing and house their animals all year round (grazing days = 0) they are getting rewarded for it. In addition, we need to account for different manure deposition manners per livestock as well as stated in IPCC Guidelines 2019 table 10.14 and 10.15 as farmers often times do not only use one type of deposition but	Distinguish between manure that is 1) produced when animals are grazing and 2) all manure that is managed elsewhere (produced when animals are housed or manure imported from outside). For 1: just apply equation 7, using the emission factor for "daily spread" for each livestock type. For 2: Sum up all manure that is produced on-farm and imported to the farm and apply GHG emission factor similar to equation 7.	We have updated the equations to quantify methane and nitrous oxide emissions from manure deposition, eliminating the parameter "grazing days" and pointing to the disaggregated factors of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories for productivity systems and animal waste management systems. The selection criteria and the reference to tables 10A.6 to 10A.9 are included in the section 9.1 under parameter AWMSl,i,t,P,S. Furthermore, Verra welcomes proposals for future methodology revisions to enable.a more precise accounting of livestock related emissions.

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		several.		
183	One Carbon World (Climit)	EF CH4. Similarly to above, the methodology is consideting the same equation 8 to estimate emissions in baseline and project and it is not clear if a project developer can consider a EF based on its own estimation using IPCC 2019 and applying a tier 2 or tier 3	Would it be possible to introduce in the methodology the possibility of consideing a tier 2 or tier 3 method to estimate, as part of the monitoring, a project specific emission factor for manure deposition?	Please see response to comment #179.
184	One Carbon World (Climit)	The disadvantage we found while looking at Quantification Approach 3 is that, for instance, if the project activity includes the use of controlled release fertilizers, urease inhibitor and slow release fertilizers. Equation 12 to 21 does not make a difference using this type of fertilizers. There should be an emission factor (EF) specific for these type of controlled release fertilizers, urease inhibitor and slow release fertilizers.	Including EF for controlled release fertilizers, urease inhibitors and slow release fertilizers.	Verra is currently supporting the externally driven revision of VM0022, which will focus on nitrogen management in agriculture, including the use of controlled release fertilizers, urease inhibitors and slow release fertilizers. The revised methodology is expected to provide a robust framework for enabling the use of tailored EFs to different practices and technologies.
185	4p1000	method for bulk density	describe how to measure bulk density	Added information and a reference to ISO 11272:2017 (Soil quality — Determination

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		determination is missing		of dry bulk density) to parameter table in section 9.2, parameter SOCwp,i,t.
186	Radicle	The first sentence in the Quantification Approach 2 section read indicates that its applied to SOC emissions only.	Quantification Approach 2 is applied for the estimation of emission removals from soil organic carbon stocks only.	Per table 5 that is correct.
187	4p1000	no information how to assess stone content	provide method how to assess stone content	This requirement aimed to avoid fungus growth when samples are stored in plastic bags. This is not an issue if soils samples are aerated. We have edited the text accordingly in the new section summarizing requirements for SOC stock measurements.
188	robofarm GmbH	Increases or decreases in livestock should not always count towards leakage and emissions In order for a farm to become carbon neutral, the farm should not have to import anything (fertilizer, additional feed or similar) and still be as productive as sustainably possible. We want the maximum of productivity that the land can sustain without any additional input. Maximize productivity for food security and minimize input in order for the farm to	Livestock changes could be accounted for by comparing to optimal stocking rates for regenerative farming. Decrease in productivity due to reduction of stocking rate should only be punished if the changes move the farm further away from the optimal stocking rate that can be achieved on the land. If an increase in livestock occurs, the additional emissions from the added livestock should not be counted against the GHG emission computation at all as long as it can be shown that no additional input such as fertilizer or feed is imported to the farm compared to the baseline. Alternatively for increase of livestock it should be possible to not count emissions from the additional livestock if the CO2 emissions per produce (kg of milk/meat) stays the same or	As stated in the VCS Program Guide document v4.2, section 2.3, "the scope of the VCS Program covers all those activities related to the generation of GHG emission reductions and removals [...]." On this basis, Verra must always ensure that project activities result in reducing GHG emissions and increasing GHG removals. In the case of projects that include livestock production systems, it needs to be ensured that emissions resulting from enteric fermentation and manure management do not outweigh the benefits of a soil organic carbon stock increase through adjusted stocking rates to reduce land pressure or increase productivity. We acknowledge that certain

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		be sustainable. There are two cases that need to be treated separately: 1) For some farms this will mean that they will have to reduce their livestock as the land on the farm currently can only sustain the livestock with additional feed, fertilizer or similar. 2) For some farms it actually means that they need to increase livestock as the land produces, or with improved management will produce, more feed that the current stocking rate can actually consume. In both cases farms are punished under the current methodology. In case 1) the productivity decline computation outlined in section 8.4.3 will make it impossible for a farm to reduce livestock to a sustainable level. For case 2) the increase in enteric fermentation will outweigh any decrease in GHG emissions even if the farm overall will produce more on the same land in a sustainable way. Therefore livestock reduction and	decreases.	project scenarios may have lower absolute GHG emissions than its counterfactual baseline scenario, even when livestock head numbers increase in the project area. However, it is crucial for the integrity of the VCS program to demonstrate that emission reductions are real. Therefore, the requirements to enable a thorough comparison of the project and the baseline scenario must be very rigorous. We acknowledge that a decreased stocking rate could have benefits in terms of reaching optimal stocking density which translates into better soil health, however in this case leakage concerns around shifting meat production would not be sufficiently addressed. And for increased stocking rates, an emission intensity approach is an interesting solution that we would like to explore further beyond the scope of this revision. Verra welcomes proposals for future methodology revisions that expand the guidelines to account for livestock emissions, e.g., using economic models to demonstrate the emission reduction effects of project activities showing that intensification does not lead to higher absolute emissions due to increased production and falling dairy and meat prices.

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		increase needs separate consideration for computation of leakage, productivity decrease and emission increase.		
189	Bluesource	Per the methodology, any project activity that is either expected or found to result in a loss of productivity greater than 5% is declared ineligible. Many regenerative farmers are finding that by reducing their input costs they can increase their profitability while experiencing modest (~10%) decreases in yield. These farmers would not be able to participate in a carbon program despite being some of the most likely to utilize regenerative practises long term.	Include an option to credit regenerative practises (no-till, cover cropping, reduced nitrogen fertilizer) on a yield -normalized basis. This could be accomplished by multiplying emission reductions/carbon stock changes by the ratio of yield in the verification period to the average yield over the baseline period.	The commenter makes an interesting suggestion. However, this leakage restriction is put in place to limit drops in crop yields and outputs which could have an important impact on food security. We therefore do not intend to allow for a yield-normalized leakage approach though may consider it in the future. We do not consider the guidelines to account for leakage from productivity declines restrictive for the adoption of regenerative practices, which may lead to initial yield declines, since the demonstration that the productivity of each crop/livestock product has not declined by more than 5% in the project scenario must only be performed every 10 years. The commenter makes an interesting suggestion. However, this leakage restriction is put in place to limit drops in crop yields and outputs which could have an important impact on food security. We therefore do not intend to allow for a yield-normalized leakage approach though may consider it in the future. We do not consider the guidelines to account for leakage from productivity declines

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				restrictive for the adoption of regenerative practices, which may lead to initial yield declines, since the demonstration that the productivity of each crop/livestock product has not declined by more than 5% in the project scenario must only be performed every 10 years.
190	Cirrus	Leakage from livestock displacement: Based on early project development in South Africa, we believe that leakage from livestock displacement should be consistently applied to both decreases in the number of cattle as well as increases in the number of cattle within the project area. The existing logic is that if fewer cattle are produced within the project area, market leakage will occur and the cattle will be produced elsewhere - classic displacement of the source of GHG emissions. We believe this reasoning is robust and reasonable due to the fluid and integrated nature of domestic and international beef and dairy markets. However, following the	An emission intensity approach is suggested in consideration of emissions from livestock. Whereas farmers should be allowed to increase the number of livestock within the project area, the emissions per unit produced (per head or unit weight) needs to be equal or less than that under a baseline scenario.	Please see response to comment #181.

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		principles of consistency and robustness, the latter should also hold true - if more cattle are produced within the project area, fewer cattle will be produced elsewhere. The reason for this request, is that across the region, conservation agriculture is leading to the restoration of soils and increased production of both commercial and cover crops. At the end of the growing seasons, farmers need to significantly reduce the biomass on field to plant (by 70-80%). They can either burn the residues and cover crops, apply herbicide, introduce additional cattle, or harvest the biomass and transport it off-site to feed livestock elsewhere. The option that is really leading to a significant increase in SOC, is if livestock are allowed to graze and trample the biomass on field, leaving a good manure / compost input layer on top of the soil.		

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191	Climate Neutral Group	It has been noticed that farmers sometimes have to reduce # heads (herd-size of cattle) due to unplanned circumstances such as draught .. Would it not be overly conservative	It is recommended that leakage due to livestock displacement is not required, provided that it can be demonstrated that the herd-size reduction was unplanned. Alternatively consider excluding enteric fermentation from project boundary, since in most an example of an improved agricultural land management practice is moving away from industrial (intensive) livestock farming.	Please note that in section 8.4.3 Accounting for Leakage from Productivity Declines, years with extreme weather events, including droughts, are allowed to be excluded when calculating the 10-year average of the productivity of each crop/livestock product in the project scenario and compare it to the pre-project productivity.
192	Agoro Carbon Alliance	The manure, compost or biosolids is documented to not have been used as a soil amendment.' please explain this in details. Does this mean when adding manure/compost to the project area, these products can not be registered as soil amendment? '		No, this does not mean that manure, compost or biosolids cannot be used as a soil amendment in the project. Rather it means that in the baseline, if it can be documented that it wasn't used as a soil amendment then it is not required to follow the steps for deduction.
193	Klim - Carbon Farmed Solutions GmbH	leakage can also occur within the project area	An idea could be to calculate the total amount of organic fertilizer produced on the farm based on the number of livestock units on the farm. Assuming that this amount would be evenly distributed on all fields, one then determines the maximum organic fertilizer amount per field that can be accounted for (provided that this does not exceed the legal requirements). This would exclude internal leakage	Please note the definition of leakage in the VCS Program Definitions document v4.2: "Net changes of anthropogenic emissions by GHG sources that occur outside the project or program boundary, but are attributable to the project or program."
194	First Climate	Organic amendments are an important part of soil carbon	We propose the following changes: - weaken the requirements for this leakage in	This section has been thoroughly discussed with experts, and is in line with

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		sequestration. This section tries to control the issue on activity shift leakage and the non permanence of organic inputs. Although the aspects are relevant, we criticize that the requirements and deduction for leakage are to stringent. Organic residues are currently highly undervalued and there is a need to valorise recycling of organic materials in agriculture. The section especially descriminates against innovative farmers that have applied compost or other benefitial organic amendments in the past. These pioneers should be invited to maintain and enhance their carbon sink services.	order to use carbon credits to enhance the efficiency in the use of organic residues - The retention coefficient should differentiate between different stabilities of organic inputs. - Exessive application of animal manure needs to be controlled by limiting livestock densities to a sustainable level, i.e. animal nutrient cycles need to be closed (also see comment on section 8.4.2).	the latest scientific understanding of leakage via shifting organic inputs across the landscape. Despite its rigour, we believe these leakage deductions are necessary to avoid over-crediting. We have added the sentence "While derived for manure, the equation is conservatively applied to compost or biosolids for the purposes of this methodology." for clarity on the use of the retention coefficient for all types of organic amendments. The commenter is welcome to propose diaggregated values in the form of a methodology deviation or a future revision of VM0042.
195	Bluesource	Inclusion of biosolids with manure and composts risks categorizing highly processed stabilised carbon additives within this leakage category.	Biosolids should be further defined to exclude stabilised and micronised carbon products.	We added a definition of biosolids as a footnote which defines it as treated sewage sludge and elimates stabilized/micronized C products.
196	First Climate	The project should be allowed or actually even required to	The baseline for livestock should be a defined as sustainable livestock density that allows for	Livestock provides essential protein and micronutrient-sources through meat and

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		reduce livestock densities. Since dietary changes require a reduction of livestock products, the project should be allowed to decrease livestock, without continuing to account for its emissions. Lower livestock densities in many areas are the most important step for a sustainable agricultural land management.	recyling of the nutrients on the land these animals are feeding from (i.e. < 1.5 "large livestock units" ~ cows per hectare). In the current text is quite the opposite, requiring the project to maintain livestock densities from the historical baseline period. This undermines the transformation to sustainable agroecosystems and a reduction in agricultural land use. Global livestock displacement from continously high demand for animal products are difficult to account for. But the guidelines could require the protein production to remain at the same level by introducing more plant based protein sources available for human nutrition. At least, the paragraph on animal displacement should be rethought.	dairy products in manifold developing countries. Grassland restoration can replenish large amounts of carbon in the soil. Our aim is to promote sustainable livestock systems that enhance SOC stocks, while avoiding deforestation and limiting cropland expansion for GHG-intensive grain feed production. In different regions of the world, these systems can look very different and it's outside of the scope of this revision to VM0042 to mandate specific livestock densities. Indeed, in some cases livestock feeding operations (i.e., not grazing) can be an important piece of a low GHG intensity livestock system.
197	Terra Global Capital	But the assumption that any reduction in livestock in the project scenario will create 100% displacement cause the same emissions (as raising cattle in the baseline condition) is inaccurate.	Leakage for livestock states "the number of livestock in the project scenario must not be lower than the number of livestock in the historical baseline period. Thus, if livestock displacement occurs, the CH4 and N2O emissions associated with livestock must continue to be counted in the project scenario (in sections 8.2.6 Equation 7and 8.2.9) to account for potential emissions leakage. " there are other leakage methods that support the estimation of displacement based on the availability and productivity of lands to the "shifted product". this leakage method is overly conservative an should be updated with a more refined approach.	Verra welcomes external input for a future methodology revision/module proposing an alternative, more accurate accounting of leakage from livestock displacement. To date, we have not received any proposal of how to demonstrate that reduced livestock numbers will not lead to increases outside of the project area. We very intensively discussed this topic internally and with stakeholders who submitted livestock accounting related comments (Britta Weber/Robofarm GmbH, Niklas Witt/Klim, Tony Knowles/Cirrus, 18 March 2022) as well as various agricultural scientists (Rich Conant, Ciniro Costa-Junior, Annette Cowie, Dan Kane, 24 June 2022) and did

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				not identify any simple to implement solution. In sum, an emission intensity based approach was proposed as perhaps the most viable but noting signficant complexity and need for input from economic models. We therefore believe this can only be considered in a future revision to VM0042.
198	Nutrient Management Institute	We made some corrections on the Eqs 51 and 52 in the annotated PDF.	see attached pdf from NMI	These equations have since been eliminated.
199	Nutrient Management Institute	statement on: negliging errors from input data. (see highlighted in annotated PDF)	I don;t think errors on physical input data is neglieable. It depends on the data type, field, and model. Projects should provide estimates on all these elements, not just negelect them to begin with	While error of physical input data may not be negligible in all cases, requiring project proponents to either directly measure such input data or quantify the error of their chosen data source would be unduly burdensome. Instead, we've implemented various procedures that we believe will help capture such errors in other terms used in uncertainty esimation. First, if the errors result in prediction error that is uncorrelated across sample/modeling points, we believe it can be assumed that it is captured in the estimate of sampling error. Furthermore, provided that proponents use the same data source for such physical input data in model validation that they use in the project, the estimate of model prediction error should capture the impact of error in physical input data on predictions. Finally, the model true-up process which is now

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				described in more detail should also help to update estimates of model prediction error as the project progresses and continue to more accurately capture such impacts.
200	Nutrient Management Institute	model prediction error	model prediction error indeed originates from errors on model inputs, but it might also originate from flawed algorithms (algorithms that need improvement or additional updates given interactions). Usually this is not only derived from analysing the prediction error, but also on model uncertainy derived from monte carlo analyses. I see later, that this is covered at page 73.	Yes, agreed. This is the intent of the model prediction error estimation.
201	Nutrient Management Institute	initial SOC stocks cancel out	I understand the logic, but just as a warrant, this is only true as long as the model is a linear system where a change in the input results in a linear change in the outputs. As soon as non-linear dynamics are included include feedback loops, this assumption is not necessarily true. As long as the C models are quite simple, i think this assumption might be ok	This language has been removed.
202	Nutrient Management Institute	Quantification Approach 2	besides this classical approach (applicable for cases where you have sites with "sample units"), there are also other sampling designs (like cLHS) that maximize variability in sampling plan (the location of sampling units) given the variation in spatial explicit covariates within sites. In that case these default error propagation rules are not applicable since there is no clear "stratified" zone for each point. in that case you might take a MC approach with leave-one-out to determine the	The uncertainty guidance has been updated to make it clear that the equations used here are meant to only provide an example and that a variety of sample designs could be used provided proponents can demonstrate they are unbiased. If cLHS were to be used across an entire project area with no additional staging or stratification, then error estimation may simply occur at the level

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			variability in C-stock. It it possible to extend this section?	of the entire project. In the interest of clarity we haven't extended this section but have included some additional language to clarify that other uncertainty estimation approaches could be used provided they match the sampling design, proponents adequately document them, and they capture the key sources of error identified for each quantification approach.
203	Bluesource	Typical calculation of area by land managers does not exclude features such as sloughs or rock piles.	We would like to see a requirement that field boundaries/acres are examined for accuracy using arial/satellite imagery.	Making sure that the field area is properly reported excluding unmanageable areas is the task of the project proponent. Section 3.10.2 of the VCS Standard document, v4.2 states that geodetic polygons that delineate the geographic area of each AFOLU project activity, provided in a KML file shall be included in the description of the project location to be specified in the project description. We have added a clarifying sentence requiring that any significant features such as rock piles, waterways or other features not under management be subtracted from the area estimate to the to definition of sample unit in section 2 and to the parameter Area_an in the parameter table in section 9.1.
204	Terra Carbon, LLC	VM0042 contains insufficient explanation or guidance for the true-up for Quantification Approach 1 that must occur	We suggest that instead estimates of project stocks in a year in which a true-up sampling is conducted be directly compared against modeled estimates of the baseline to generate a	New section 8.6.1.3 "Remeasurement, model true-up, and cumulative crediting" has been developed to clearly define

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		at least every 5 years in which soils are directly sampled and measured in order to true-up model predictions. The limited information regarding how to operationalize the true-up has led to differing interpretations, and current language suggests a procedure that could unnecessarily limit credit issuances. We highlight a few key points here. Language on p. 64 suggests that for the true-up, model structural error only needs to be applied in the baseline scenario. However, the process to estimate model structural error in VMD0053 is based on comparing the model's ability to simulate differences between project and baseline scenarios drawn from relevant literature. Also, as written, uncertainty deductions are not estimated for the project or baseline scenario individually but are instead applied to net emissions. If the intent is to apply uncertainty deductions	corresponding estimate of net project credits, and any credits previously issued in verification events in which the project scenario was modeled simply be deducted from the new issuance. This scenario would allow for the issuance of credits on an annual/semi-annual basis through just the use of models, with a periodic correction of a project's cumulative net credit balance based on empirical fieldwork, which is consistent with the intent of this blended approach and the original intent of the primary authors.	model true-up.

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		to the baseline and project scenarios, this section needs to be amended for clarity. Language on p. 24 suggests that following a true-up sample, field data are used as inputs to model the project scenario for that verification event and results are then compared against the simulated results of the prior monitoring period. In practice, comparing data from these true-up field samples to previous simulation results from the prior monitoring period could arbitrarily limit issuance of credits.		
205	Terra Carbon, LLC	Equation 51: should SOCi,wp,t in the description under the equation ("Where: SOCi,wp,t … SOC stock for the project for sample unit…") have a line over it and refer to mean SOC stock?	Consider replacing: "Where: SOCi,wp,t … SOC stock for the project for sample unit…" with ""Where: SOCi,wp,t [with line over it] … mean SOC stock for the project for sample unit…"	This equation has been eliminated.
206	Terra Carbon, LLC	Equations 55 and 47 use the term 'crediting period,' which has a more specific meaning in VCS projects (i.e. the timeframe in which a project	Assuming this term is meant to refer to period between a current verification event and the previous one, consider replacing 'crediting period' with 'verification report' or 'verification period.'	We agree with the comment and have changed the terms to "verification period" (which is defined in the VCS Program Definitions) along with other changes to section 8.6 . Furthermore, the comment

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		is eligible to receive credits).		raises the need to change several other instances of "crediting period" to "baseline period" since the VCS Standard V4.2 introduced the new requirement that all ALM projects re-assess their baseline every 10 years (i.e., the baseline period) and not at the 20 year crediting period renewal.
207	Indigo Ag	The new text proposed in Section 8.6.1.1 (Analytical calculation of error propagation) has fundamental issues: it ignores the sample design, and its estimators do not seem to be correct. Also, the section is quite confusing and hard to understand. Ultimately, we think a simpler, analytical approach could be viable, and that it should be possible to show that it matches the Monte Carlo method in Section 8.6.1.2, but the revision proposed here has many fundamental issues that lead us to recommend that this section is far from being ready. Before sharing specific comments, we would like to		Please see response to comment #96.

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		point out that the sample design should not be ignored. It determines how to estimate both total emissions reduction and its sampling variance. There is discussion on page 65 about doing a simple random sample with replacement of sample units for computational reasons (which seems unnecessary to us, as explained more in the itemized list below). However, the estimators in Equations 52–60 make no reference to the sample design used to choose where to collect the soil measurements needed to run the model. This whole section, especially the parts surrounding equations 52–60, needs significant revision so that it incorporates the role of the sample design. We recommend that it mirror the subsequent sections by presenting 1–3 example sample designs and the appropriate estimators for those designs.		
208	Indigo Ag	Below is a list of comments about specific parts of Section 8.6.1.1.		Equations in this section have been extensively edited and many of those

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		1) The definition of DSOC is confusing: it's defined as "the mean difference with and without practice change at one time". Please write what it's the difference of. One has to read this text multiple times to infer that it's the mean project-minus-baseline difference of SOC stocks at the same point in time. 2) In Equation 51: a) A bar is missing over SOC_i,wp,t in the list of variable definitions. Also missing is a mention of the "mean" in the definition of this variable. b) Please define what the "mean" refers to. Over what land is the mean taken? The areal-average at the point? 3) Project developers should not be encouraged to do a mean over a random subset "to reduce computational effort" (page 65). Computing a mean should not be hard for today's computers,		mentioned have since been eliminated.

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		especially given how small datasets will be due to the cost of taking soil measurements. 4) The definition of ΔSOC in equation 52 — as the "mean change of SOC stocks since the previous measurement period" — does not mention that it's also a subtraction between the project and baseline scenarios. The current definition makes it sound like it's the temporal change of SOC stocks in one scenario. 5) Equations 52–53 appear to let projects take a biased sample. Does Σ_i A_i need to equal the area of the project? If it does, then write that. If it does not, then what prevents a project from choosing a sample that is biased toward over-estimating the reductions in emissions? (This point relates to our chief concern with the draft of this section, that it ignores the sample design.) 6) What is the sample design		

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		assumed in Equation 52? The fact that n is defined as "number of sample units included, n ≤ total number of sample units" suggests that equation 52 is meant to be an estimator of a target parameter (the areal average reduction in emissions from the SOC pool) rather than a definition of that target parameter; where can we find this estimator in a standard text?		
209	Indigo Ag	7) The quantity "s_{pred,D_soc}^2" is mentioned in a sentence (at the top of page 67) without being defined, making it hard to interpret. It's somewhat defined at the bottom of that page, but not precisely enough to be understood. 8) Why does Equation 54 have a sum of squared relative areas (Σ_i a_i^2) in the denominator? This estimator looks unlike any we have seen in standard texts. Please provide a reference or derivation for this estimator. This equation also introduces		Please see response to comment #208.

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		two new quantities that are not defined: $\bar{D_{SOC,t}}$ and $\bar{D_{SOC,t_previous}}$. 9) Why is equation 54 called "variance for units"? It appears to play the role like that of sampling variance, but as noted above we do not recognize this estimator, so we are unsure what equation 54 is estimating. Why introduce this new term "variance for units"? How does equation 54 relate to equation 63 (the estimator of sampling variance for the two-stage design)? 10) "N_wp" is not defined. It seems to first appear in Equation 55. 11) The sentence after equation 55 says "The baseline and project scenarios have the same SOC stocks, so the variance for the first credit period is…". We think the authors meant to write the following text wrapped in brackets: "The baseline and project		

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		scenarios have the same SOC stocks [at the start of the first credit period], so the variance for the first credit period is…". 12) The quantity on the left-hand side of Equation 55, $s_{pred, \overline{ΔSOC}}^2$, does not appear to be used. Note, in particular, that it is not used in equation 57. What then is the role of Equation 55? Why is it presented?		
210	Indigo Ag	13) If the following statement were true then it would be silly for VM0042 to require soil sampling: "However, because both baseline and project scenarios are modelled and their differences are calculated over time, the effect of the initial conditions largely cancel out (FAO, 2019)." Consider modifying that statement to address that contradiction. 14) The following statement is misleading because there are very likely interactions		These sections have been edited to address the inconsistencies raised here.

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		between management and other model inputs, resulting in these uncertainties not canceling out: "Importantly, the physical input data (other than management data) are identical for project and baseline, so their uncertainty cancels out when the outputs for the modeled baseline is subtracted from those for the project." Our viewpoint is that these input uncertainties are being propagated to the model (because we only have access to measurements with errors), so they are being captured implicitly, and future work may elucidate ways to better quantify and reduce the impact of input uncertainties. 15) In Equation 57: a) Please define s_{\bar{ΔSOC}}^2 as a variance not as "uncertainty" so that readers can understand it. b) What is s^2_{ΔSOC_unit}? That is in the equation but not defined.		

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		16) Equations 59 and 60: the parts involving the area ai don't make sense to us. 17) Example: two-stage PPS/SRS design: "tile" was meant to mean the second-stage unit that is so small that it's equal in area to the cross-sectional area of a soil core; it was not meant to be a generic term for a sample unit or for first-stage units, as it's now being used (which creates confusion). 18) Equation 64 unnecessarily defines "n_1" when the variable "n" from Equations 62 and 63 suffices. 19) The factor of f in equation 64 doesn't make sense; Equation 63 is already the sampling variance of the areal-average emissions reduction (it's not the sampling variance of the areal-average project-minus-baseline stock difference). 20) Equation 64 introduces a		

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		new quantity, s_pred^2, that looks similar to notation above but matches no other notation exactly (note the differences in what is written in the subscript in equations 64, 60, 57, 56). Also it's defined as "(Approximate) standard error," but it's a variance. 21) [[COPIED FROM COMMENT ON SAMPLING/STRATIFICATION]]: The example two-stage sample design used in Section 8.6 uses areas of fields as weights for selecting fields, and those areas can change over time. The estimators of the mean and of its variance (Equations 62 and 63) should be adjusted to reflect changes in area.		
211	CIBO Technologies		Add bar above SOC_i,wp,t and the word "mean" in the definition	Please see response to comment #205.
212	CIBO Technologies	"The fewer the number of sample units included the higher will be the expected uncertainty since it includes sampling uncertainty. The lowest uncertainty is	Remove the sampling verbiage and require the uncertainty to be calculated over all samples.	This language has been eliminated and it has been clarified that estimation of uncertainty is based on population samples and should be based on an uncertainty estimator that appropriately

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		expected if all the sample units are estimated since then no uncertainty introduced by sampling" -- There's nothing in the math that adds to the uncertainty value with smaller n. It's also not clear why computational effort needs to be reduced here. This is not a complicated calculation and can easily done on a simple spreadsheet for many, many samples.		matches the sampling design.
213	CIBO Technologies	It would be helpful to have an introductory paragraph for this section. It's unclear on initial reading what the Quantification Approaches are for.	Add intro paragraph to Section 8.6.1.1	Introductory language has been added to each subsection.
214	Terra Carbon, LLC	This section contains the only reference to the Independent Evaluation Expert (IEE) in VM0042. It may be worth adding a reference to VMD0053 for clarity and more information on the IEE.	Consider adding a reference to VMD0053 as a footnote or after the sentence: "The method (one of the nine discussed in (Hyndman and Fan, 1996)) should be documented by the project developer and evaluated as part of the Independent Evaluation Expert (IEE) assessment." For example, "The method (one of the nine discussed in (Hyndman and Fan, 1996)) should be documented by the project developer and evaluated as part of the Independent Evaluation Expert (IEE) assessment described in VMD0053."	Section 8.6 has been overhauled after the public consultation. Further, VMD0053 has also been revised including with respect to the role of the independent modeling expert and we believe this is sufficiently explained in VMD0053.

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215	Indigo Ag	Section 8.6.1.2 ("Monte Carlo Method for Error Propagation") includes a significant amount of language suggested to Verra by Indigo staff. At a minimum, staff of Indigo should be acknowledged as contributors to this v2.0 of VM0042. It is misleading by way of omission to write on page 2 that "Revisions to the uncertainty section were prepared by Dr. Brian McConkey, Chief Scientist, Viresco Solutions and Dr. Beth Ziniti, Research Scientist, Applied Geosolutions." For the proposed revision to section 8.6.1.2 alone, the following members of the Indigo team should be acknowledged for contributing: Ram Gurung, Brian Segal, Charlie Brummitt.		Acknowledgements have been adjusted. Contributors from Indigo are listed in the methodology text v1.0.
216	Indigo Ag	As currently written, Section 8.6.1.2 has the same overarching issue as in Section 8.6.1.1: the draft proposes that sampling variance can be allowed to be		This section has been edited to address these issues. Based on expert consultation, we adapted an approach similar to that outlined in CAR SEP Appendix D. This approach includes procedures to estimate sampling error

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		ignored. We are concerned by this change. As we noted in response to Section 8.6.1.1 and to the change to the definition of "sample unit" on page 8, sampling variance plays an important role in Quantification Approach 1 and in Quantification Approach 2, and allowing it to be ignored degrades the quality of VM0042. The following text proposed on page 73 allow project developers to ignore sampling variance: Equation 65 to Equation 69 require that sample units have a defined area. If the sample unit is defined as a point (location with no defined area), then a subsample of the project is modeled, and the sampling error is quantified with Equation 70 to Equation 74. Below is a list of more specific comments. 1) Why is A_i included on both sides of equation 65?		through Monte Carlo simulations that propagate model prediction errors and/or input data errors effectively.

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		2) We think "emissions reduction" is a more understandable term than "flux difference," and it matches what is used in the public (see, e.g., this page at WWF and this announcement from the White House). We recommend that VM0042 choose one catch-all term for all reductions in emissions (be they "removals" or "abatement") so that generic variables like $\hat{y}_i$ can be succinctly defined. We see how "flux difference" could also work, but it is hard to understand, and to new readers it begs new questions (a flux of what exactly? a difference between what and what?). 3) Equation 66 doesn't make sense. We suspect the authors forgot to write the variance of a certain quantity in the left-hand side of the equation. 4) Equation 68 does not define the quantity on the left-hand side		

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		5) In equation 69, it appears the definition of "h" is incomplete, both in the table of variables below equation 69 and in the sentence that follows: "Parameter h refers to (Hyndman and Fan, 1996) recommended interpolation, but they also report eight other common methods implemented in software, which would give sufficiently similar results when the simulation size is large enough (L>=100)." 6) The percentile computed in Equation 69 reflects only model variance, but not sampling variance. As noted elsewhere, we disagree with the proposal in this draft to allow sampling variance to be ignored, and hence we think Equation 69 is not relevant: we are not aware of a way to estimate a percentile of the posterior predictive distribution of the total emissions reduction when that distribution captures variability coming from which units got selected for sampling.		

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		7) Example 2 on page 77 has a few minor issues. Line 2 of Example 2 has a typo: "is a called a". Also, in that same sentence, it is a bit awkward to call the two stages of the 2-stage design as sample units with two "sizes"; we suggest that the word "stage" be used here instead of "size" (to align with survey statistics terminology). The next sentence says "The smaller units (points) are the project sample units, which do not have equal sampling probabilities". Note that if m_i is a constant across i (a case mentioned in VM0042 v1 and on page 71 of this document), then this is a self-balancing design, and every point has equal probability of being sampled.		

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217	robofarm GmbH	Control site - sample units pairs: It is an 1:n or n:m relation? "Quantification Approach 2 is applicable for SOC stocks only and has the baseline represented by control sites that are linked to one or more project sample units." This means a control site can be linked to many project sample units but can a project sample site also be linked to several control sites? For example: Say we have sample units {SU1, SU2, SU3} and control sites {CS1, CS2}. If the control sites and sample units all match in terms of similarity we could for example have the pairs CS1-{SU1, SU2, SU3} and CS2-{SU1, SU2, SU3}. Is that the case?	Clarify if a project sample unit can be part of many control site - project site pairs.	In theory sample units (project sites) could be matched to two or more control sites. However, this would complicate the procedures to estimate the baseline SOC stock change attributed to a given set of sample units. As such we believe that there can only be one control site per one or more sample units, not vice cersa. We updated the text to clarify this.
218	robofarm GmbH	Typo in the equation? The summations run over s=... but in the sums in numerator and denominator A_i and i are referenced respectively. We assume that should be A_s and s instead?	Please correct or clarify how i is defined in the equation.	This equation has been eliminated.

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219	robofarm GmbH	Typo in the equation? In the denominator the sum is over all i. Should this be sum over all A_i instead?	Please correct or clarify how the denominator is defined in the equation.	Please see response to comment #218.
220	robofarm GmbH	The variance computed in equation 79 is inappropriate for use in deductions for uncertainty. (This comment assumes that we use the result of equation 79 in equation 84 which we are not sure of, see the above comment.) In equation 79 we compute variance of the SOC difference for control site - project site pairs. This variance will depend on how similar the pairs behave during the 5 years. If the pairs represent different soil types and potential different states of soil degradation than the difference will most likely be large. In fact, the sole purpose of choosing different control sites is to make sure we can establish a baseline for different soil types that behave differently so this is expected. This means that the variance	Base any uncertainty deduction for Quantification approach 2 only on measurement of uncertainty, not on variance of the resulting differences or clarify what the result of equation 79 is used for.	Agreed. The uncertainty procedure in QA2 has been updated and corrected. See now equation 59. The target variance parameter we are after is the variance of the net difference between change over time in both the project and baseline scenarios. This form should deal with the fact that control site and project pairs may have different starting stocks. Regarding the comments on differences in soil types and, by extension, the potential to sequester carbon. Such issues are what the matching criteria for control plots are intended to guard against.

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		computed in equation 79 will depend on how different the soil types are between control site - project site pairs and not on how uncertain their measurements are. The variance will only be low if the soil types are the same. Consider for example the following case: A farm has two types of fields, one which has high potential to sequester carbon SOC (FH1, FH2, FH3) and one which has low potential to sequester carbon (FL1,FL2,FL3). For example, the FL fields could already have a higher percentage of SOC or be of a soil type that is known to sequester less carbon that the soil type of FH. We now pick a control site for each kind of field and assign fields according to the SOC %, so that we have two project site - control site pairs FL1:{FL2,FL3} and FH1:{FH2,FH3}. The amount of carbon sequestered in FH fields DH (computed as mean(FL2,FL3) - FL1 by Eq 78) will likely be higher than		

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		the amount of carbon sequestered in FL fields DL (computed as mean(FH2,FH3) - FH1 by Eq 78) and we call these SOC differences DH and DL respectively. Variance will be computed from the set {DH and DL} according to equation 79 (although it might not be obvious from the way equation 79 is written). The variance of SOC change will therefore be higher than it would have been if both pairs had sequestered the same amount and {DH and DL} would be equal. But this is not due to uncertainty of the measurement but because the two field types differ. Even if there would be no variance in the samples taken from control sites and project sites and the measurement therefore have no uncertainty the variance computed with equation 79 would still result in a value > 0. If we then would use this variance in equation 84 this would result in a reduction. We must distinguish between		

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		uncertainty of measurements and variance of the results. Uncertainty deduction should only be based on the uncertainty of the measurements and not on the variance of the results.		
221	Indigo Ag	This section needs overhauling to discuss the sample design with which soil samples are taken. The equations give some target parameters but no instructions for how to estimate them from a random sample. The presentation is also lacking in clarity. For example, the first two equations have some issues: 1) The notation N_{i,c} is confusing; we think the i should not appear in the subscript because this variable refers to a control site, not to a pair of control site c and project site i. 2) The denominator of equation 76 doesn't make sense. It is a sum over the		This section has also been extensively edited to ensure that the uncertainty estimator is correct. The target parameter is an estimate of the uncertainty of the emissions reduction, which is based on an aggregated esimate of the uncertainty of the two sample populations (baseline control and project sites) that are used to estimate emissions reductions. Uncertainty estimators for either of those sample populations are then based on a combination of the variance of soil carbon estimates at both the start and end of the verification period, minus their covariance, and must be based on the sample design employed. Similar procedures are widely employed in sampling statistics and described in deGruijter 2006 and Cochran 1977.

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		labels i. 3) The definition of SOC_{ps,c,s,t} under equation 76 doesn't define "s". Finally, we are not convinced that the equations in this section are correct. For instance, notice how the areal weight a_{ps,c} appears in 78, yet in the example equations for variance the areal weights are not squared, as they should be.		
222	Agoro Carbon Alliance	There is no illustration of uncertainty deduction in the case of the application of Quantification Approach 2. Can you confirm that this is because no credit deduction will be operated if approach 2 (measure and re-measure) is followed?		Uncertainty deductions do indeed apply to QA2 and are based on sampling and measurement error contributions to total uncertainty. This section has been updated with a more comprehensive example.
223	robofarm GmbH	How is uncertainty deduction computed for SOC quantification approach 2? Please clarify how uncertainty deduction should be computed when Quantification approach 2 is used for SOC and	Please add an explanation for how uncertainty reduction for SOC measure and remeasure is done.	This section has been updated. The s^2-SOC term that is calculated based on the equatiosn in 8.6.2 is what is used to calculate the uncertainty deduction for QA2. Additional language has been added in 8.6.4 to further clarify this point and figure 3 has been updated.

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		Quantification approach 3 for N2O emissions. Figure 3 which nicely summarizes the computation methods for uncertainty reduction only shows estimation of delta F_t,. for Quantification approach 1 but not for Quantification approach 2.		
224	Indigo Ag	This draft revision proposes four rules for uncertainty deduction (UD): the old rule with thresholds 0% and 15% and the exceedance probability rule with confidence parameters 55% and 70%, with the latter parameter value (the more stringent one) being used when modeling is done when N2O is calculated using Quantification Approach 3. We are supportive of using a more severe uncertainty deduction rule when N2O is calculated using Quantification Approach 3, to compensate for it underestimating uncertainty. We would prefer, however, to simply estimate uncertainty in Quantification Approach 3	We recommend that the one uncertainty deduction rule be equation 85 with confidence parameter 70%. We do not support the proposal to keep the old UD rule in VM0042 (equation 83) for two reasons. The main reason is that the rule makes it very hard to interpret credits (the confidence in credits varies with effect size), and the confidence in each credit can drop to as low as 50%. A more minor concern with equation 83 is that when a project has a large reversal, equation 83 lets the project register a zero-credit period (which is not the desired behavior).	Uncertainty deduction rules have been simplified to improve clarity and uncertainty deductions are now separated for each source in VM0042, obviating the need for the different pathways. As for QA3, we have elected to not include prediction uncertainty (i.e. uncertainty in EFs) in the estimation of uncertainty for ERRs quantified with this method given that adequate data to estimate that uncertainty may not be available in many cases. Instead we have elected to implement greater requirements regarding accuracy and conservativeness in the choice of EFs to ensure estimates of ERRs are conservative. Requiring EF uncertainty to be estimated and propagated would also represent a departure from the use of EFs in other methodologies on the VCS standard, which would require potential revisions to the standard, as well. The original relative uncertainty deduction rule remains in

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		(there is already precedent for uncertainty of default equations in their use by the IPCC); that way, there is just one uncertainty deduction rule. We view the decision tree in Figure 3 to be unnecessarily complicated and a big step backward in terms of interpretability of credits produced with VM0042.		VM0042, as well.
225	Terra Carbon, LLC	Some minor edits to the text above Equation 87 could help with clarity.	Consider replacing: "The net change in carbon stocks is the sum of the net carbon dioxide removals resulting from the net increase in soil carbon, tree biomass and shrub biomass carbon pools (see equation xx, section 8.5). Therefore, the buffer deduction applies only to the estimated net GHG emissions removals in equation 53 below." with "The net change in carbon stocks is the sum of the net carbon dioxide removals resulting from the net increase in soil carbon, tree biomass and shrub biomass carbon pools (see equation xx 34, section 8.5). Therefore, the buffer deduction applies only to the estimated net GHG emissions removals in equation 53 87 below."	Thank you for highlighting this cross-reference error to the relevant equation, which we have corrected now.
226	Carbon Count	Buffer credits references the AFOLU Non-permanence Risk Tool and lacks specific considerations for soil carbon	Incorporate methodology specific buffer credits.	Please note that the AFOLU non-permanence risk tool has recently been updated to include agricultural land management (ALM)-specific risks and

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		and isn't tied to activities which impact SOC.		mitigation options. These updates include adding risks and mitigation options related to training farmers in new agricultural practices and the potential for a decrease in agricultural yield that may occur during the first few years of some regenerative agricultural practices. The updated version of the AFOLU NPRT is expected to be published in June 2022.

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227	Bluesource	Historic management records in this box indicate a 5-year requirement. Elsewhere in the methodology it is indicated that the minimum length is as little as 3 years (depending on rotation)	Update the language in box 1 to reflect a minimum historic management period of 3 years.	Verra agrees with the comment and made the correction
228	Radicle	The parameter SOCbsl,I,t indicates that soil samples will be taken from the same locations throughout the duration of the crediting period. Is this correct or		The definition of "sample unit" has been revised. In addition, Appendix 6 provides an example based on a multi-stage design for a grouped project with multiple landowners with

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		is the intent that soil sampling locations will change throughout the project? Is every sample unit within a project intended to be sampled? Will their be fields or farms that don't ever get sampled over the course of the crediting period?		multiple fields to clarify procedures of sampling.
229	Terra Carbon, LLC	Multiple parameters highlighted in section 9.1 require supporting evidence from sources outlined in Box 1, but no specific guidance is provided as to when practice evidence needs to be supplied and how.	We suggest the addition to section 9.1 of a parameter table related to the reporting of management practice information for sample units.	To our understanding, the issue raised is a sign of the missing description(s) of Activity_an as the basis for parameters of Area_an and PA_an equation 1. We have added this as a parameter to section 9.1. In addition, the project proponent is requested to provide this information under section 1.11 Description of the Project Activity in the VCS Project Description Template, and, at a later stage, in section 3.1 Implementation Status of the Project Activity of the VCS Monitoring Report Template.
230	4p1000	no description for bulk density measurements and/or stone correction or depth required is provided	add additional description on how to determine SOC stocks (i.e; method for bulk density, stone content correction and depth to be taken into account	Added information and a reference to ISO 11272:2017 (Soil quality — Determination of dry bulk density) to parameter table in section 9.2, parameter SOCwp,i,t. Stone content correction is addressed under another comment from the same commenter referring to section 8.2.1.
231	4p1000	no description for bulk density measurements and/or stone correction or depth required is provided	add additional description on how to determine SOC stocks (i.e; method for bulk density, stone content correction and depth to be taken into account	Please see response to comment #230.

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232	Terra Carbon, LLC	The proposed revisions add text to the desciption of how SOC stocks at time t=0 are back-modeled or measured. These edits are not consistently applied, however. Only in some cases does the text include reference to"...(back-) modeled to t =0 from measurements via conventional analytical laboratory methods, e.g., dry combustion" (see pages 25, 122, 127). Additionally, the implications of this bolded text are that projects cannot use soil carbon content data measured using other permissible techniques (e.g. proximal or remote sensing) as model inputs. This may be Verra's intention, but since the language is not consistent, it may be something to consider more closely in final edits.	Ensure consistent language on pages 25, 119, 122, and 127 for the text block that is generally written as: "The soil organic carbon stocks at time t=0 are calculated based on directly measured soil organic carbon content and bulk density at t=0 or (back-) modeled to t =0 from measurements via conventional analytical laboratory methods, e.g., dry combustion, performed within +/-5 years of t =0, or determined for t=0 via emerging technologies..."	Text has been amended to clarify in Table 6 and Table 8, explicitly mentioning that proximal sensing techniques (e.g., INS, LIBS, MIR and Vis-NIR) with known uncertainty following the criteria in Appendix 4 may be used to measure SOC content. In parameter table under section 9.2, we amended the text in row "Frequency of monitoring/recording" for clarification under parameters ƒ(SOCbsl,i,t-1)
233	Terra Carbon, LLC	VM0042 currently contains two different parameter tables for Nexl, and the two different tables provide different units for Nexl and a different description. Looking to the referenced IPCC values in the 2019 update to the 2006 guidelines, volume 4, chapter 10, table 10.19, the parameter tabel for Nexl on page 102 has the appropriate units (kg N deposited / t livestock mass / day). However, the corresponding equation (Equation 24) is built around the units of the Nexl parameter on	Consider removing the duplicative parameter table for Nexl on page 107, which has incorrect units, and correct Equation 24 to match the appropriate units for Nexl and to convert from kg to tonnes as follows: Fbsl,manure,l,i,t = [Nexl * (Wbsl,l,i,t / 1000) * Pbsl,l,i,t * Daysbsl,l,i,t] / 1000	We have corrected the unit, added the division by 1000 and removed the duplicated parameter table for Nexl (formerly on page 107). We have corrected the unit of Nex_l,P to "kg N deposited/head/year."

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		page 107 (kg N/head/year). Therefore, Equation 24 should be corrected to match the units of Nexl provided in the referenced Table 10.19. Furthermore, Equation 24 as it is currently written multiplies by 1000 when it should divide by 1000.		
234	4p1000	30 cm depth is quite arbitrary; should be the ploughing horizon or the A horizon; moreover, there are agricultural practices that affect SOC below the A horizon or ploughing depth - these should be taken into account as well	consider revising the depth	The minimum sampling depth is 30 cm. Projects are welcome to sample deeper if resources are available and SOC stock changes are expected at greater depth. We have clarified that stratified random sampling must be applied as a sampling strategy, as recommended by several experts and soil organic carbon handbooks. An alternative strategy may only be used by requesting a methodology deviation demonstrating that a different strategy is more accurate for the specific project conditions.
235	4p1000	sampling procedure should be a minimum representative	provide some guiding- e.g. take 10 replicates per plot and pool	Currently, VM0042 aims to provide flexibility to projects and is therefore not prescriptive on the number of samples to be taken. Verra has initiated the development of a VCS Tool focused on soil sampling, sample processing, and SOC laboratory methods. The tool will include detailed guidance on sampling design, number of replicates and other detailed procedures. Therefore, we will leave the specification on number of samples required open in this revision. We have clarified that stratified random sampling must be applied as a sampling strategy, as recommended by several experts and soil organic carbon handbooks. An

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				alternative strategy may only be used by requesting a methodology deviation demonstrating that a different strategy is more accurate for the specific project conditions.
236	4p1000	air drying and grinding is the generally accepted pretreatment procedure	replace 'Soils must be shipped within 5 days of collection and should be kept cool until shipping' by 'soil should be airdried, an aliquot grounded and stored in vials before shipping' kept cool until shipping	Please see response to comment #187.
237	4p1000	Description of Parameter should be before the abbreviation	replace 'Data/Parameter' and 'Description'	The order for these parameter tables is given by the VCS Methodology template (latest version v4.1). We do not agree with this change.
238	Terra Carbon, LLC	The inclusion of the following phrase while true may create confusion about appropriate methods: "Note that bulk density measurements are not necessarily required to determine SOC stock changes on an ESM basis." ESM approaches require one to collect the same data necessary for a volumetric approach to bulk density, and users should still use a corer/auger with sufficient diameter to account for the mass of coarse fragments in order to get a correct estimate of soil mass.	Consider removing this sentence or clarifying that if using an ESM approach, tooling must be sufficient to achieve an accurate estimate of soil mass.	Agreed. Sentence removed.
239	Agoro Carbon	Fossil fuel consumption can be monitored, or the amount of fossil fuel combusted can be estimated	Monitoring of fuel consumption on farm/field/machine level is likely to be very difficult. E.g., when farmers	This is an interesting proposal. However, we consider it outside the scope of the current revision. We invite the commenter to propose

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	Alliance	using fuel efficiency (for example l/100 km, l/t-km, l/hour) of the vehicle and the appropriate unit of use for the selected fuel efficiency (for example km driven if efficiency is given in l/100 km)	implement regenerative practices only on the part of their farm, and some machines operates on all fields, to get disaggregated activity data is a big challenge. This results in the high uncertainty in the data quality, and also huge efforts to collect such data. In fact, changes in fuel consumption as result of project activity are linked to changes in field operations, e.g. cover crop planting through direct drilling. We therefore propose to introduce an option for a project developer to define each type of changed operation for a specific practice, and apply a default fuel consumption factor for such practice (e.g. litre/ha), if such factor is available from recognized public sources (scientific literature, reports etc). These factors might be used e.g. 1) for ex-ante estimation of fuel consumption, to estimate the significance of the emissions of fuel consumption for definition whether this shall be monitored or not 2) to define whether there is a decrease in fuel consumption related to the implementation of specific practice	their approach backed up with peer-reviewed literature sources for default fuel consumption factors in a future revision of VM0042, which would have to go through public consultation.
240	Terra	The Wbsl,l,i,t parameter table could reference standard livestock live mass	Consider pointing projects to the 2019 update to the 2006 IPCC	We have included this reference as potential source of data in the parameter table for

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	Carbon, LLC	values from the IPCC.	Guidelines, Volume 4, Chapter 10, Annex 10A.1, Table 10A.5 for sourcing typical animal mass values in addition to the currently listed source of data.	parameters Wbsl,l,i,t
241	Nutrient Management Institute	description of measurement methods and procedures	The IEEE Geoscience and Remote Sensing Society/Standards Committee started last year with a global initiative to develop standard calibration and operation procedures for proximate sensing. Might be valuable to add / link also to guidelines for proximate sensors besided the classic analyses.	Verra has communicated with the IEEE P4005 working group developing a soil spectroscopy standard. Once their protocols are published, Verra will consider including a reference to them in a future revision of this methodology.
242	Nutrient Management Institute	soils should be kept cool	interesting statement. Changes in SOC due to storage at room temperature are neglectable compared to measurement error. This might be optional rather than mandatory	Please see response to comment #187.
243	Agrorobotica	Crop residue retention is an important Agricultural Land Management (ALM), but promotes the soil samples mixing with vegetal residue and may overestimate the SOC content by the analytic techniques.	"The criteria and consideration to ensure robustness and reliability (Table 9)" should recommend a removal procedure of vegetal residue before following the determination of Soil Organic Carbon (SOC) content, regardless using traditional technique, as dry combustion, or emerging proximal	Please note that the sentence "All organic material (e.g., living plants, crop residue) must be cleared from the soil surface prior to soil sampling. " is included in the parameter table in section 9.2 under parameter SOCbsl,i,t and SOCwp,i,t.

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			sensing technologies.	
244	Bluesource	It does not seem practical or most accurate to require SOC analysis be performed on the same samples used to quantify soil bulk density. SOC samples should be composited, while bulk density samples should not. Furthermore, the industry standard for diameter and depth of core used for these two sample types is very different.	We would like to see the line "Analysis of soil carbon content should be performed on the same samples for which dry soil mass is measured." removed and replaced with a requirement that these samples be taken at the same time and from similar locations within each stratum.	Agreed. We recognize that this requirement is too onerous for project proponents and it can hamper compositing samples. We have replaced the sentence in the new section under 8.2.1 summarizing requirements for SOC stock measurements.
245	Bluesource	The requirement that soil samples should be "kept cool until shipping" is too vague in its application.	Specify what this requirement entails (e.g., refrigerate, keep out of direct sunlight, etc.)	Please see response to comment #187.
246	Geotree	Remote sensing technologies play an important role in the transition to digital and scalable MRV systems. RS tools allow the implementation of a cost-efficient stratified sample design based on models predicting SOC (or other C pools) distributions at scale and can be used to interpolate estimates across larger areas for potentially greater spatial accuracy.	Include the use of RS-supported methods such as digital soil mapping for the optimization of the stratified sample design. A distinction shall be made between two approaches: (i) RS methods for the statistical-based stratification of manual soil samples, and (ii) RS methods for determining the C pool by a combination of remote sensing data and field measurements (e.g., VT005 Tool for measuring above ground live forest biomass using RS).	A new VCS Tool is currently under development to combine physical soil sampling with a range of environmental datasets and remote sensing to estimate SOC stock changes within a project area. VM0042 v2.0 now includes a reference to this new tool. In addition, Verra has initiated the development of another VCS Tool focused on soil sampling, sample processing, and SOC laboratory methods. The tool will include scoping of RS methods to derive stratification which could also include AI-based approaches as the commenter suggests.

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247	Nutrient Management Institute	FA SOILS PORTAL	you might add there SoilGrids	We added a reference to SoilGrids in section 9.3.1 as available digital soil maps supporting definition of strata.
248	Nutrient Management Institute	pre-sampling	as already mentioned above, these guidelines might be different when the "project area" is limited to a single farm. In that case you are also dealing with "within field" variation versus "among field" variation, and then the variation within fields might be bigger that among fields. On regional scale, this is not relevant.	We do not expect areas of VCS projects to be limited to one single farm; a large scale is required in terms of cost-benefits. The revision to the uncertainty section will however consider the different variability within field and among field.
249	Shell	"Baseline SOC stocks must be reported for the baseline control sites and for each stratum within the project area, whenever stratification is applied as a sampling strategy (see section 9.3.1)". This should be clearer – does this mean to say that the baseline control site must be sampled at the same temporal frequency as their linked sample units (e.g., if re-sampling project sites every 2 years, all control sites must be re-sampled every 2 years as well)?		We agree that the sentence is somewhat confusing and have deleted it. However, the commenter raises a valid question around timing of sample collection. We have clarified that control site and project site samples need to be taken in the same season. This is included in expanded the guidance on baseline SOC stock measurement under Section 8.2.1 to clarify procedures.
250	Terra Carbon, LLC	A minor edit to text referring to true-up could help with clarity and consistent use of terminology. The text references "model validation" in the context of soil	Consider removing reference to "model validation" in the sentence: " It is therefore recommended to take at least 3-5 composite	New section 8.6.1.3 "Remeasurement, model true-up, and cumulative crediting" has been developed to clearly define model true-up. In the section referred to in this comment, "model

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		sampling for true-up. This could lead to confusion since "model validation" has a distinct meaning in the context of VM0042 and VMD0053 outside of this specific sentence.	samples within each stratum for model validation (true-up) or when using quantification approach 2 measure and re-measure."	validation (true-up)" has been replaced by "model true-up."
251	ICRAF	In relation to the paragraph starting with "In general, variability in soil properties, including SOC stocks, increases as the project area grows". This is not necessarily true and we would suggest the following changes...	The sampling design needs to capture variability within the project area. An unbiased spatially stratified approach is important to capture variations in soil carbon across the project area.	Please see response to comment #87.
252	ICRAF	In relation to "Stratifying the project area into homogenous strata defined by factors that influence SOC stocks will usually reduce errors associated with project-scale estimates of SOC stocks. The SoilMaps and Databases of the FAO SOILS PORTAL41, e.g., the Harmonized World Soil Database, or locally available (digital) soil maps can help choose different strata". While this is true to some extent, there are very large uncertainties associated with the HWSD, for example. See suggestion below.		The HWSD should not be used to provide baseline SOC contents or stocks, but to identify areas of different soil types or other soil properties to assist the identification of strata for sampling designs. No change required.
253	ICRAF	We suggest an additional approach...	A spatially stratified and balanced sampling design can also be employed. For example, in the LDSF, sampling clusters are spatially stratified within a 10x10 km landscape and sampling plots	The current draft of VM0042 does not exclude such an approach. The commenters are welcome to apply it in a VM0042 project. Furthermore, Verra has initiated the development of a VCS Tool focused on soil sampling, sample processing, and SOC

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			are randomized within each cluster, also providing a nested design. The size of a site can be adapted to a particular project area, but with spatially balanced sampling to reduce bias and capture variability. This also allows for scale dependencies in terms of variation in SOC and biomass C to be assessed.	laboratory methods, which will include detailed guidance on sampling design. We have clarified that stratified random sampling must be applied as a sampling strategy, as recommended by several experts and soil organic carbon handbooks. An alternative strategy may only be used by requesting a methodology deviation demonstrating that a different strategy is more accurate for the specific project conditions.
254	ICRAF	Additionally, we would suggest the following…	Composite soil samples should be taken from a fixed plot size/area within a project to ensure consistent spatial support. The plot size can be varied, but generally should not exceed about 1,000 m2 to maintain a scale consistent with remote sensing platforms such as Landsat or Sentinel 2. This is particularly important if models based on remote sensing satellite data are used to assess spatial variations in soil carbon.	The current draft of VM0042 does not exclude such an approach. The commenters are welcome to apply it in a VM0042 project. Furthermore, Verra has initiated the development of a VCS Tool focused on soil sampling, sample processing, and SOC laboratory methods, which will include detailed guidance on sampling design.
255	Indigo Ag	The discussion of stratification and sample design in Section 9.3.1 (Sample Design) has a few shortcomings that we suggest be addressed. First, the recommendations about stratification are more relevant to Quantification Approach 2 (measure-		First, we agree that currently this section is mostly useful for Quantification Approach 2. However, it is also relevant for the baseline and true-up measurements under Quantification Approach 1. Second, the disadvantages of grid sampling were laid out in section 9.3.1. We have clarified that stratified random sampling must be

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		and-remeasure) and less useful for Quantification Approach 1 (measure-and-model) because it focuses on heterogeneity of soil carbon and ignores information about performance of a model. One reason to sample more in a stratum is that model uncertainty is high there. Second, the sentence about grid and linear sampling patterns is misleading: these designs can be implemented with randomness such that the estimate of the spatial mean is unbiased (see, e.g., Sec. 7.2.7 of Sampling for Natural Resource Monitoring). Furthermore, this sentence misses what we think is the more important shortcoming of grid sampling: there is no unbiased estimator of variance of the sample mean. That shortcoming leads us to recommend that grid sampling be forbidden from being used in VM0042 projects. A goal of VM0042 should be to be conservative about both point estimates of emissions reduction and about uncertainty of those estimates, and the latter is not possible with grid sampling. (Relatedly, we recommend not inserting "grid sampling" on page 155 as one of the allowed sample designs.) Third, we suggest that project		applied as a sampling strategy, as recommended by several experts and soil organic carbon handbooks. An alternative strategy may only be used by requesting a methodology deviation demonstrating that a different strategy is more accurate for the specific project conditions. Third, we have added a sentence for changes in field boundaries to be considered. Content in section 8.6 will be handled under section uncertainty. Fourth, the MDD guidance aims to provide project proponents a robust orientation of the number of samples they need to take. This is a frequent inquiry Verra receives. We added a sentence clarifying that this is not a requirement.

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		developers be warned that field boundaries do change over time (as errors in boundaries are corrected, buildings are constructed, waterways change course, and so on), so care is needed when using boundaries in sample designs. For example, the example two-stage sample design used in Section 8.6 uses areas of fields as weights for selecting fields, and those areas can change over time. The estimators of the mean and of its variance (Equations 62 and 63) should be adjusted to reflect changes in area. Fourth, we think the newly-added Equations 88 and 89 are not relevant enough to merit inclusion in the methodology because they are not needed to quantify credits. The minimum detectable difference (MDD) is important for field experiments that evaluate the performance of an intervention, but for calculating carbon credits the goal is different: it is to optimally reduce uncertainty. As a result, the MDD appears nowhere else in the document. Said differently, in the language used by the software SAS, the analytical goal of the methodology is closer to an analysis of confidence interval precision than to t tests.		

Section 9 - Monitoring				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
256	Radicle	This section indicates that the plan for statistical analysis needs to be submitted as part of the validation package, however that seems too late in the process. The soil sampling and analysis at least for t=0 should have already taken place by the time a project would undergo validation, and therefore any uncertainty or errors would be propagated in the baselining and would be both costly to redo, but also detrimental to the financial ROI for projects where credits may take a hit.	Include a pre-validation step for sampling design and modeling plan to allow for errors or mistakes to be uncovered at an early stage.	Please see response to comment #87.
257	Radicle	"Baseline control site management plan Quantification Approach 2 is applied, and no applicable performance benchmark is available, a baseline control site will be linked to one or more sample units." is missing a word or two.	When a baseline control site management plan using Quantification Approach 2 is applied, and no applicable performance benchmark is available, a baseline control site will be linked to one or more sample units.	We have revised the indicated sentence as part a larger revision to clarify the text.
258	Terra Carbon, LLC	Some edits and formatting changes to the text below the paragraph on "Modeling Plan" could help with clarity.	Consider making "Baseline Control Site Management Plan" at the beginning of the second paragraph the title of a new subsection 9.3.3. When this phrase is removed, it seems like there might be some text missing before "Quantification Approach 2 is applied..." Consider adding "If" or "When."	Moved paragraph to section 9.3 Description of the monitoring plan

Appendices

Appendix 1				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
259	EKI Energy Services Limited	Under Reduce tillage/improve residue management should also include avoidance of crop residue burning.	Including avoidance of crop residue burning under "Reduce tillage/improve residue management	Agreed. Added example practice into Appendix 1
260	Nutrient Management Institute		I would think increasing organic fertilizers would increase SOC (see Lessman et al., 2021). Does water management also includes altering groundwater tables?. I would remove this "soil probiotic" as a measure to increase SOC (not sufficiently underpinned by science)	Changed reduced to improved… in App1. We left soil probiotics in as an example. We agree that the science is new, however, we want VM42 to allow for novel emerging approaches and ultimately if the amendment is ineffective it would result in no net SOC changes and hence no ability to generate VCUs.
261	4p1000	integrated crop livestock systems are a promising system to increase sustainability in agricultural systems with positive soil effects	Add 'system innovation' - integrated crop-livestock systems	No response needed, supportive comment.
262	Radicle	The list does not include integrated systems, which are very applicable in tropical regions, such as Brazil, and have huge potential for carbon storage. There is a important Brazilian public policy concerning the agricultural	Include the following list: Crop Livestock Integration systems (CLI): In integrated crop-livestock systems, the intercropping of	Commenter makes valid points about the importance of diverse management practices able to deliver positive GHG outcomes and cobenefits and specific to the Brazilian context. However, VM42 is geography-agnostic and Appendix 1 title and

Appendix 1				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
		sector and land use is relevant to compliance with NDCs: The Sectoral Plan for Mitigation and Adaptation to Climate Change for a Low-Carbon Emission Agriculture (ABC Plan). The ABC Plan was structured along six lines: Restoration of degraded pastures, integrated crop- livestock-forest systems and agroforestry systems, biological fixation of nitrogen, no-till systems, planted forests and treatment of animal waste, and specific actions to adapt to changes in climate. The ABC Plan is strategically important to the country and the world. The effective implementation of these plans delineates possible paths to ensuring increased agricultural productivity and, potentially, profitability for the farmer, considering, directly or indirectly, environmental aspects. Thus, it is suggested that Appendix 1 also describes the technologies related to integrated systems.	annual crops with grass is common in order to establish the pasture and produce stubble for no-till farming. In the Central-West and Southeast regions of Brazil, three types of integration are generally observed: i) in livestock farms, grain crops (rice, soy beans, corn and sorghum) are introduced in pasturelands to restore the productivity of the grass; ii) in farms specializing in grain crops, forage grasses are introduced to improve soil coverage in no-till systems and, during the fallow, use of forage in the diet of cattle (interim harvest system); and iii) in farms that, systematically, adopt CLI to intensify the use of land and benefit from the synergy between the two activities. In southern Brazil, the areas that, in summer, are generally planted with corn, beans, soybeans or rice, are used for animal production in the winter, on annual pastures, with primarily oats, ryegrass, wheat or rye. Crop-livestock-forest integration (CLFI): In crop-livestock-forestry systems, annual crops (soybean, maize,	introduction states that it is a non-exhaustive list and project proponents can propose any practices not on the list so long as they can demonstrate that they represent an improvement over the pre-existing practice(s). That said, we added a few suggested generic examples such as silvipasture and ICLS

Appendix 1				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
			sorghum, rice, etc) are usually planted in the first two years between tree rows to minimize the negative cashflow and avoid animals damaging the forest component. As of the second year, depending on the tree species, it is possible to plant forages (livestock-forestry stage). Pasture can be introduced by intercropping grain crops and forages. The CLFI system is considered the most complex, but it is, nevertheless, recommended for any level of production, using intercropping, succession or rotation cultivation. This system combines, on the same farm, different production systems, such as those for grains, fibers, meat, milk and agro-energy from biomass. Crop- forest integration (CFI): The CFI system involves an intercropping of tree species, native or exotic, with annual or perennial crops. Livestock-forest integration (LFI): The LFI system (either silvipastoral system or arborization of pastures) is a type of integrated system in which the production of forage plants and the raising of animals is	

Appendix 1				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
			integrated with trees, simultaneously or sequentially, in the same unit of area. It is vital to use forest and forage species that are suitable for the production environment.	

Appendix 2				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
263	Indigo Ag	We do not see any immediate issues with this other than possible leakage accounting (requirements to maintain productivity) issues raised earlier. We want to make sure the entire methodology is consistent with section 8.4.		Please see response to comment #8.

Appendix 3				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
264	Cloud Agronomics	The approach described in Appendix 3 for identifying additionality criteria is too narrowly defined. As currently written, the approach described in Appendix 3 for	Suggestion: Verra should change the additionality criterion so that additionality is assessed exclusively within the extent of the project (i.e. the area under management). We note that this is	Common practice (aka activity penetration) assessments are a well-established approach to determine additionality in GHG crediting programs. The existence of the CDM tool with a 20% threshold specifically for this purpose is testatment to this. Using the example

Appendix 3				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
		determining whether a new project activity is common practice will be a barrier to adoption. The problem is with the assumption that common practices are by-definition not additional. It is not clear why the percentage adoption of any given practice has any bearing on the degree to which a practice is additional. What matters is (1) whether the practice is additional within the extent of the project and (2) whether there is net sequestration above the baseline-control scenario. For example, consider a fictional county in Nebraska that contains 10,000 fields. Say that all but 10 of these fields practice cover-cropping. The adoption rate is therefore 99.9%. As currently defined, the owner of the 10 fields is prevented from entering into a carbon program by commencing cover cropping. This is a perverse outcome, given that the carbon sequestered in these 10 fields associated with the adoption of cover cropping would clearly not be sequestered in the absence of the change in management (i.e. it is additional in the	the method for additionality determination being employed under the 2021 Australia Carbon Credits Methodology Determination under which carbon offset credits are currently being generated in Australia under the auspices of the Clean Energy Regulator. Under the Australian program, additionality is not linked exclusively to the presence or absence of practices. Under the Australian methodology, additionality is assessed using a baseline reporting period calculated within the extent of the project, and requires the 'expect[ation] that carrying out the eligible management activities proposed by the relevant land management strategies will increase the carbon sequestered in the land.'	provided by the commenter, the argument is that since 99.9% of the fields were successfully able to implement the practice, carbon finance should not be a barrier to implementing the practice and the limited pool of carbon finance should rather be directed to promising practices that indeed face barriers as demonstrated by low penetration rates (i.e., <20%).

Appendix 3				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
		true sense, through not in the sense that additionality is defined under VM0042). Imposing any limit on the adoption rate of the activity places an upper limit on the total land area in each state/province that may be enrolled in carbon sequestration projects under VM0042.		

Appendix 4				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
265	ICRAF	Where it reads "The applied spectrometer should have a spectral resolution of 10 nm or less across the visible and near-infrared range (between 400 and 2500 nm), and spectra should be recorded in this range at 1 nm intervals." This applies to vis-NIR only, not MIR. So, perhaps add...	Or, in the case of MIR spectroscopy, between 2500 and 17,000 nm.	To avoid limiting new methods and technologies, we have replaced this sentence with a requirement to report the spectral range covered by the instrument applied and the actual resolution of the measurement.
266	ICRAF	On calibration and validation.	Calibration models need to be validated/tested using an independent holdout of data to assess the accuracy of the model used for samples not included in the calibration model. Typically, 70% of the samples would be used for calibration/training and 30% for	Verra agrees with including this additional guidance. We have added a general requirement to report data-splitting noting that commonly 70% of the sample data will be used for calibration/training and 30% for validation/testing.

Appendix 4				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
			validation/testing. Ideally (where possible), model performance for samples that are outside the distribution of SOC in the calibration model should also be assessed and reported.	
267	Nutrient Management Institute	approximate corrections	I think it would be valuable to elaborate here more and define minimum standards for the robustness and accuracy of the corrections applied	We have added a list of general information for the application of proximal sensing technologies to be included in the monitoring plan and monitoring reports. VM0042 now requires providing further details on representativity of calibration/validation data, demonstration of accuracy, and determination of uncertainty to include in the calculations of error propagation in Section 8.6 of the methodology.
268	Nutrient Management Institute	spectra should be recorded in this range at 1 nm	please remove this recording statement. Since this is just an interpolation between the actual resolution of measurement, defining a minimum interval does not add additional information, and can be disregarded.	To avoid limiting new methods and technologies, we have replaced this sentence with a requirement to report the spectral range covered by the instrument applied and the actual resolution of the measurement.
269	Blockware Tech	Does a specific IR spectrometer wavelength range (400-2500nm) need to be specified? Many mobile Vis-NIR devices on the market are not full spectrum and yet are delivering very promising results when compared to in-lab results.	A suggestion would be to focus on the results of an emerging technology and not on specifying too many constraints on the exact process. Requiring an in-field scanner be full-spectrum increases costs substantially.	Please see response to comment #268.

Appendix 4				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
270	Agrorobotica	1) For LIBS, it was suggested that the soil must be dried at least 24h at 40C. But, if the soil is dried in air for at least 48h, the moisture is withdrawn, and it is possible to obtain and ensure robustness and reliability for direct measurement of SOC with LIBS;	Soil samples have to be dried for at least 24 h at 40 °C or at least 48 h at room temperature. In particular, the second procedure is in accordance with sustainable strategies for energy saving.	Verra agrees with adding this option.
271	Agrorobotica	Additional scientific publications which address different algorithms as multiple linear regression, partial least square, artificial neural network, among others for the pre-treatment LIBS spectra and calibration of the LIBS system to optimize its use and reduce uncertainties for the determination of SOC concentration for a variety of soil.	Additional Scientific Publication: Maldonado Jr. W., Milori D. M. B. P., La Scala Jr. N.. Changes in quantity and quality of soil carbon due to the land-use conversion to sugarcane (Saccharum officinarum) plantation in Southern Brazil. Agriculture, Ecosysrems and Environment, 240 (2017) 54-65. Milori D. M. P. B, Segnini A., da Silva W. T. L., Posadas A., Quiroz R., Martin-Neto L. 2011. Emerging techniques for soil carbon measurements. CCAFS Working Paper no. 2. CGIAR Research Programo n Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark. Available online at: www.ccafs.cgiar.org. Nicolodelli, Gustavo; Marangoni, Bruno S.; Cabral, Jader S.; Villas-Boas, Paulino R.; Senesi, Giorgio S., Dos Santos, Cléber Hilario; Romano, Renan A.; Segnini, Aline; Lucas, Yves; Montes, Célia R.;	Verra agrees with adding this further guidance.

Appendix 4				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
			Milori, Débora M.B.P.. Quantification of total Carbon in soil using laser-induced breakdown spectrscopy: a method to correct interference lines. (2014) Apllied Optics, v. 53, n. 10. Segnini A., Xavier A. A. P., Otaviani-Junior P. L., Ferreira E. C., Watanabe A. M., Sperança M. A., Nicolodelli G., Villas-Boas P., Oliveira P. P. A., Milori D. M. B. P.. Physical and chemical effects in soil carbon quantification using laser-induced breakdown spectroscopy. American Journal of Analytical Chemistry 5 (2014) 722-729. Villas-Boas, P. R., Marco A. Franco, Ladislau Martin-Neto, Hero T. Gollany, Debora M. B. P. Milori. Applications of laser-induced breakdown spectroscopy for soil analysis, part I: Review of fundamentals and chemical and physical properties. European Journal f Soil Science, Vol. 71 (2020), n. 5, 789-804. Villas-Boas, P. R., Marco A. Franco, Ladislau Martin-Neto, Hero T. Gollany, Debora M. B. P. Milori. Applications of laser-induced breakdown spectroscopy for soil analysis, part II: Review of elemental analysis and soil	

Appendix 4				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
			classification. European Journal of Soil Science, Vol. 71 (2020), n. 5, 805-818.	
272	Nutrient Management Institute	verra is tracking developments related to remote sensing	verra is tracking developments related to remote sensing and smart algorithms fusing nearby and proximate sensing	Please see response to comment #64.
273	Geotree	There have been considerable advancements in SOC determination with hyper and multispectral satellite data and AI prediction models. However, a lack of consensus in the methods involved represents a challenge for their scalability and accuracy. Establishing criteria and considerations for these technologies is necessary for a consolidated RS approach and lay the ground for a benchmark in digital MRV.	Variation in the measurement conditions (e.g., instrumentation and protocols) of spectral data difficult the reduction of systemic and random effects in soil modeling. Moreover, variation in the analysis and prediction model development (i.e., preprocessing, calibration and validation) methods causes inconsistency and differences in model accuracy and uncertainty. Therefore, the use of agreed-upon standards and protocols in both data acquisition and data analysis is necessary to enable conclusive comparisons between soil images and spectral data from different sources. Based on sources featured in the Bibliography prepared for this revision, the following procedures are proposed for the use of	A new VCS Tool is currently under development to combine physical soil sampling with a range of environmental datasets and remote sensing to estimate SOC stock changes within a project area. VM0042 v2.0 now includes a reference to this new tool. We invite the commenter to provide his input during the public consultation of the draft tool in the coming months. In addition, Verra has formed a working group for digital MRV. This group will further develop guidance on the suggestions of the commenter. These are outside of the scope of VM0042.

Appendix 4				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
			satellite images (here, we emphasize on the Sentinel-2 sensor): • Using the same processor for atmospheric correction (e.g., Sen2Cor) • Using the same atmospheric and geometric correction methods • Using the same procedure for up-scaling and down-scaling of satellite images • Conducting both laboratory and in-situ soil spectra measurement to obtain not only lab-spectra, but also in-situ surface reflectance for the validation purpose • Using internal soil standard (ISS) to correct and align soil spectra obtained from different spectrometers • Using an agreed-upon soil sample collection and sample preparation protocol for collecting lab and in-situ data • Justify the choice of the mathematical procedure to preprocess data and prediction model (e.g. machine learning algorithm) depending on the sample size. This could help to direct developers into the further development and improvement of existing procedures.	

Appendix 4				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
274	Indigo Ag	Please refer to comments for section 8.2, page 25		No response needed.

Appendix 5				
#	Organization	Comment	Stakeholder Proposed Change	Developer's Response
275	robofarm GmbH	Combinatorial explosion of choosing criteria for control sites. There are too many slope classes and we do not believe that many are needed. The similarity criteria have to be chosen very carefully to make sure that the possible combinations of criteria are not leading to state explosion. See for example "Influence of Slope Gradient and Aspect on Soil Organic Carbon Content in the Region of Niš, Serbia", Jakšic et al, 2021. CLARIFICATION (22 Feb): The point we meant to make was that slope might have an influence on SOC but not enough to justify the 5 classes. It would be interesting for us to see based on what the 5 classes were chosen.	Reduce the number of slope classes to three classes: 1-16, 16-45, > 45.	The slope classes are taken from an established USDA publication cited in Appendix 5. There is huge variation within the commenter's 1-16% and 16-45% slope classes that can affect ecosystem processes. As such, we are keeping the USDA slope classes.
276	Bluesource	The resolution at which slope classes are to be analyzed is undefined.	Specify what resolution is required when specifying slope class (per field, per acre, etc.)	We have amended the text pertaining to Topography in the first row of Table 7 to the following: "Most frequent slope class must be the same in sample units and control sites (to be determined from a slope map or via a

				GIS slope analysis)." We will finalize additional guidance describing steps to determine the most frequent slope class in the coming days and add it to Appendix 5.

General Feedback

General Feedback				
#	Organization	Comment	Stakeholder Proposed Changes	Developer's Response
277	Gaiago	The possibility to use measure and remeasure is much welcome, thank you for this new version. Control sites are a common practice in agriculture to estimate the impact of a new seed / product / practice / etc. which makes it an interesting solution for baseline estimation. As soils are highly variable, flexibility in the choice of control sites must be given to make the methodology applicable.		Supportive comment, no response needed.
278	Cloud Agronomics	Although not specifically addressed in the revisions to VM0042, remote sensing methodologies have advanced since the original publication of VM0042 and can address many of the challenges identified in this revision to VM0042. Numerous peer-reviewed contributions to the academic literature have demonstrated that remote sensing methods based on visible and near-infrared spectroscopy or multispectral satellite		A new VCS Tool is currently under development to combine physical soil sampling with a range of environmental datasets and remote sensing to estimate SOC stock changes within a project area. VM0042 v2.0 now includes a reference to this new tool. Quantification approach 1 (QA1) refers to process-based models for biogeochemical simulation of SOC dynamics. Quantification approach 2 (QA2) relies on direct measurement of SOC content at different points in time, even if the measurement method requires the use of

General Feedback				
#	Organization	Comment	Stakeholder Proposed Changes	Developer's Response
		remote sensing can quantify organic carbon content in soil (e.g. Gomez et al. 2008; Castaldi et al 2019; Sothe et al. 2022). Remote sensing also benefits from the collapse in the variance as a function of the number of sample units described on page 74, a point also made on page 168 with respect to proximal sensing. Potential future adoption of remote sensing technology under VM0042, as described in Appendix 4 under emerging technologies, will require more clarity about the distinction between quantification approach 1 and quantification approach 2. For example, biogeochemical models that require farm practice data inputs clearly fall under quantification approach 1. Remote sensing techniques could arguably fall under either quantification approach 1 or quantification approach 2. Remote sensing methods collect direct physical measurements (spectral radiance, which has units of radiant flux per unit area per unit solid angle per unit wavelength). But remote sensing methods require calibration using statistical inference to estimate		mathematical models for calibration and validation. In our view, the new tool will provide guidance for direct estimation of SOC contents under QA2. Furthermore, Box 1 lists the allowed sources of information for all un-defined activity/management related model input variables and parameters. The use of remote sensing (e.g., satellite imagery, manned aerial vehicle footage, drone imagery) is listed as one of the possible sources to support historical management records.

General Feedback				
#	Organization	Comment	Stakeholder Proposed Changes	Developer's Response
		soil organic carbon content (a model). Would such approaches fall under quantification approach 1 or 2? Speaking clearly about this distinction will help to reduce uncertainty among groups anticipating the approval of remote sensing methods under a future version of VM0042 and could avoid the need for future revisions. Clarity around this issue will also directly benefit proximal sensing methods described in Appendix 4, because proximal sensing techniques also do not fall squarely within quantification approach 1 or quantification approach 2.		
279	Climate Neutral Group		Provide more clarity regarding the requirement of # samples taken per field. As well as: if the project contains identical fields, is sampling 1 field sufficient? This is in the context of application of QA1.	Currently, VM0042 aims to provide flexibility to projects and is therefore not prescriptive on the number of samples to be taken. Please note that further sampling guidance is currently under development through a designated VCS Tool. We have clarified that stratified random sampling must be applied as a sampling strategy, as recommended by several experts and soil organic carbon handbooks. An alternative strategy may only be used by requesting a methodology deviation demonstrating that a different strategy is more accurate for the specific project conditions. The second part of the comment is not entirely clear-- in reality there is no such thing

General Feedback				
#	Organization	Comment	Stakeholder Proposed Changes	Developer's Response
				as identical fields given high spatial variability in soil properties.
280	Climate Neutral Group	Identification of most appropriate soil sample taking and testing methods may be left to the project proponent, based on e.g., cost-effectiveness, baseline techniques (i.e., what were the sample taking and testing methods available, most commonly applied in the historic look-back period and/or applied during longterm soil experiments documented in literature, etc.). Provided that consistency and recording of the applied methods is applied during baseline and project measurement.		No response needed, supportive comment.
281	First Climate		Can you please provide automated links from the content list and other references to certain sections, tables or equations within the document?	These will become active when the clean version (without tracked changes) of the document is published.
282	Radicle	Given that a diverse audience may read this methodology, acronyms need to be defined when they are first used or provide a glossary for look up.		The methodology includes a section on Definitions (section 3). Each acronym is defined when first used.
283	Carbon Count	The methodology is written with a lot of optionality resulting in broad coverage which is great for adoption however the lack of prescriptiveness on the	Add an optional module which provides prescriptive guidance (where possible) on executing a carbon project to standardise the	VM0042 is purposely conceived with high flexibility to enable improved agricultural land management (ALM) projects in different regional and national contexts and for

General Feedback				
#	Organization	Comment	Stakeholder Proposed Changes	Developer's Response
		methodology means that two projects under the same methodology can produce drastically different quality of carbon offsets due to different approaches and/or optional components throughout. This results in more complexity when attempting to trade the resulting carbon offset since the credits aren't fungible.	quality of carbon. This would allow projects to indicate if they followed a given prescriptive submodule and upon passing audit, ensure a minimum level of carbon quality. This reduces administrative burden when trading credits as it provides an avenue for more standardisation where desired.	different farming systems. The high quality of the generated carbon credits does not arise solely from the rules of the methodology, but more importantly from the robust framework of the VCS Standard, including the independent VVB project assessment. Key elements such as additionality, leakage and the requirement to account for a full GHG balance of each implemented practice, constitute the integrity of the generated Verified Carbon Units. Several stakeholders have raised the need for more prescriptiveness in order to easy their project design. Verra aims to address this through the overhaul to the uncertainty section 8.6 defining more strictly how sampling units should be treated. In addition, a new VCS Tool for sampling, sample processing and soil carbon analysis is under development, which provide further standardization to these essential procedures for ALM projects. If the commenter sees the need for more prescriptive guidance for a certain type of agricultural system or a specific category of practices to be implemented, Verra welcomes the commenter to pursue the development of a module following the procedures outlined in the VCS Methodology Approval Process document.

General Feedback				
#	Organization	Comment	Stakeholder Proposed Changes	Developer's Response
284	Carbon Count	Methodology lacks considerations for landowner/stakeholders to provide commitment and consent to a project. This may result in a lack of permanence.	Incorporate landowner/stakeholder commitment declarations.	Please note that land tenure and resource access/impacts are addressed in Table 6 of the AFOLU NPRT.
285	South Pole	Exclusion of the SOC pool: In the current version, the methodology requires the monitoring of the SOC pool under approach 1 & 2, which requires increased data and costs to ensure the baseline (as well as project scenario is sufficiently robust). However, some practice changes in eligible activities do not (i.e. in case of rice irrigation) or just marginally (grazing management) influence SOC stocks but positively influence other GHG emissions (CH4 etc). In such cases, it would ease the implementation of projects to allow to exclude SOC stock monitoring (as de minimis influenced), as long as sufficient evidence can be provided that these would not be reduced or positively influenced. An example for this case could be the utilization of the DNDC model for rice	Allow for the exclusion of SOC monitoring where stocks are not influenced by project activity	VM0042 is designed for projects with the adoption of improved agricultural land management practices focused on increasing soil organic carbon (SOC) storage. Therefore, SOC is the major carbon pool affected by project practice(s) that is expected to increase in the project scenario; consequently, it should be included in the project as indicated in Table 2. Verra is currently exploring the option of developing a VM0042 module to describe the procedures to account for methane reductions through improved irrigation in rice systems without accounting for SOC stock changes.
286	CIBO Technologies	The general process of proposing and submitting a PDD for agriculture has something of a chicken-and-egg problem as it's written now. PPs need to specify their geography, which are	Agricultural projects may require a modified review process that accommodates the complexity of the projects. One idea is to make the process a two-part review. In	The commenter raises an interesting point. There is relatively little body of experience using VM42 that PPs can use as a reference. However, that will always be the case with any recent methodology and some iteration

General Feedback				
#	Organization	Comment	Stakeholder Proposed Changes	Developer's Response
		farms, typically of limited size. In order to have enough farms included for reasonable risk-tolerance, many farmers need to be enrolled -- dozens to hundreds at minimum. In order to include farms in the project, the farmers need to sign a contract that describes very specifically will happen during the project and what their commitments are. However, without any existing successful projects to look at, it's impossible to know whether the exact program activities proposed (including exactly what pieces of information the farmer needs to provide and exactly what supporting evidence will be needed) will be approved by the VBB -- or whether changes will need to be made. Changes necessitate going BACK to these many, many farmers and asking them to re-sign a contract. This erodes trust and may cause some farmers to drop out, requiring the PP to then need to re-do the whole project and resubmit to the VBB.	the first part of the review, the PP lays out the process they are going to use to choose land/farms for inclusion, including all exclusion criteria, as well as the methods used for collecting and verifying farm management practices. With a VBB stamp-of-approval that these collection methods are thorough and appropriate, the PP then has confidence engaging with farmers a single time to enroll them into the project. The second part of the review would consist of the entirety of the project geography, specific soil sampling design on that geography, and all other parts of the PDD that relate specifically to the geography of the project.	will be needed to establish workflow between PPs and project participants. It is correct that contracts are needed to show proof of project ownership and the relationship between the project proponents and the farmers. However, evidence of ownership and rights are only required for the project's initial instances. In other words, the project proponent does not need to gather signed contracts from all potential farmers that are not part of the initial set of instances (i.e., included in the first monitoring). We believe that PPs should clearly explain the phases of a carbon project to interested and enrolled farmers, including the different steps: project design, validation of the design, 1st verification, subsequent verifications, etc. By explaining this, farmers will be aware that after the initial design, changes could occur. This applies to all AFOLU carbon market projects, where land managers and/or owners are involved. To address the concern, consider the following: 1) Project proponents can request a highly detailed quotation to the VVB to identify the main validation criteria and requirements. Furthermore, they can contact a consultant with experience in the development of carbon projects that would be able to identify the principal risks of changes after the initial project design.

General Feedback				
#	Organization	Comment	Stakeholder Proposed Changes	Developer's Response
				2) A VCS Tool under development focused on soil sampling, sample processing, and SOC laboratory methods will increase the guidance for projects to allow for project planning and development with less room for interpretation by the VVBs. 3) To the same purpose, the updated version of the uncertainty section will clarify requirements to minimize bias and assess sampling-related uncertainties. The two-part validation proposed by the commenter is interesting but would require updates to the VCS Program which would be a lengthy procedure and would raise concerns around differential treatment for ALM projects. That said, Verra is open to exploring program updates to better facilitate ALM project implementation beyond the context of this VM42 v2.0 revision.
287	Climate Neutral Group	The change from "Annually" to "Whenever new instances are added" is interesting because it implies that the methodology is designed for grouped projects.	Change "whenever new instance are added", into "whenever new IALMs are adopted and/or whenever new instances are added, but at least every annum for stock-take of all IALMs and/or project activity instances included in year t"	This data source is required for the common practice assessment, which is an element of additionality. Additionality is only determined at validation for initial instances, and further when a project adds new instances which could be t=5 years, i.e., not annually. For instances that are already deemed additional there is no need to monitor them to redetermine additionality. Therefore, we do not agree with the proposed change.

General Feedback				
#	Organization	Comment	Stakeholder Proposed Changes	Developer's Response
288	One Carbon World (Climit)	Considering all the modifications done, what is the date for the new methodology to become valid?		Verra plans to post VM0042 v2.0 in Q3 2022.
289	One Carbon World (Climit)	As we have been developing a project (already listed as "under development") we have some questions that are based on real situations. We have been working in a grouped project with two initial instances, but we wonder to know what is the interpretation of Verra or project developer when new instances are added with ALM activities that were not included in the first instances. For example, should we structure a grouped project and PD with all the potential activities, being open to any new instances? Or should the project be structured with the activities included in the first instances and in the future, if new instances arrive with other activities, a new PD must be developed?		Suppose you will register your project as a "grouped project" (i.e., a project to which additional instances of the project activity, which meet pre-established eligibility criteria, may be added subsequent to project validation). Then, you will have multiple "project activity instances" that could be a farm or a group of farms (Information about grouped project requirements can be found under Section 3.5 of the VCS Standard, v4.2). Section 3.5.2 of the Standard indicates that "the baseline determination and additionality demonstration for all project activity instances shall be combined (e.g., multiple wind turbines shall be assessed in combination rather than individually)." Section 5.5.6 indicates that "where a project includes multiple project activity instances from multiple project activities, the project activity instances from each project activity shall be assessed in accordance with Sections 3.5.1 – 3.5.3." Please see sections 3.5.8 to 3.5.13 of the Standard for more information on baseline scenario requirements and grouped projects. In future, please submit questions related to projects listed in the VCS pipeline to secretariat@verra.org

General Feedback				
#	Organization	Comment	Stakeholder Proposed Changes	Developer's Response
290	Radicle	It is important that all changes made to the version that is under public consultation are kept in the consolidated version. These changes are extremely important for tropical agriculture and for developing countries.		Verra will address all comments received during public consultation between 23 December 2021 and 5 February 2022. The selected VVB will assess the responses to comments and the resulting changes to the methodology text. This will be reflected in the finally published v2.0 of VM0042 and VMD0053.