Pangolin Associates

Sustainability, Energy & Carbon Management

Gold Standard Verification of Afforestation on the Big Island of Hawaii

Verification of

Afforestation on the Big Island of Hawaii

For
Hawaiian Legacy Hardwood (HLH) and its affiliates
Box 22218, Honolulu, HI 96823

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Report Category:	Afforestation and Reforestation Project
Project ID	GS 3260
Project Name	Afforestation on the Big Island of Hawaii: Restoring Native Hardwood Forests and Enhancing Multiple Ecosystem Services
Project Location	Latitude: 155° 23′ 07.98″ to 155° 22′ 19.73″ W Longitude: 19° 58′ 16.93″ to 19° 56′ 40.53″ N
Project Owner and address	Hawaiian Legacy Hardwood (HLH), Box 22218, Honolulu, HI 96823
Project Contact	Andrew Callister, Treehouse Consulting
Audit Team Leader	Sunil Kumar Sharma
Audit Team Member	Helen Chandler
Internal Reviewer	Adina Cirtog
Audit Standard:	GS A/R requirements V0.9 (Road Test)
Reporting Period	1st January 2015 to 28 February 2020
Draft Audit Report Issued Date	7th December 2020
Final Audit Report Issued Date	9th December 2020

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1. Introduction

1.1 Scope of the Verification

Hawaiian Legacy Hardwoods (HLH), the Project Owner (PO) commissioned Pangolin Associates, as an accredited VVB under the Gold Standard, to undertake verification of Afforestation on the Big Island of Hawaii: Restoring Native Hardwood Forests and Enhancing Multiple Ecosystem Services (the Project). The scope of this verification entails an assessment of the compliance of the project information with the requirements of the Gold Standard for Global Goals for Afforestation and Reforestation Projects. Since the Project is in the transition phase to the new Standard, Gold Standard for Global Goals (GS4GG), the previous version of the Gold Standard Afforestation/Reforestation (A/R) Requirements V 0.9 (Road Test) applies to the verification of the Project. To this effect, the PO and Pangolin Associates signed an engagement plan on 7th November 2019. The audit scope was revised in the engagement plan to meet the requirements of the Standard and the current situation due to COVID-19. The updated engagement plan (dated 20th August 2020) stated the following objectives for the verification of the reporting period from 1st January 2015 to 28th February 2020:

1. To assess the New Area added to the existing project area against the GS4GG Principles and Requirements.
2. To undertake verification of the Project's actual carbon stocking at the end of the reporting period 28 February 2020 and how the current Project carbon stocking aligns with the number of validated CO2-e Certificates issued as the result of the Project's Initial Certification.

During the review of the documentation provided by the Project Owner, we realized that the project has implemented the project activities in the eligible planting areas within the project area but has not added new sites to the existing project area. According to the GS requirement, the New Area Certification is required where an expansion of the project area occurs by adding new areas into the existing project area. Since the HLH project has not added any new area into the project area already validated in 2015, the New Area Certification is deemed not necessary for this project. Hence, this audit focuses on the second objective stipulated in the engagement and assesses the following key areas to accomplish the above objective as per the guidance provided by the GS Secretariat:

<u>Verification for Performance Certification:</u>

1. Assess if there have been any changes in the size of the project area or any of its boundaries.
2. Assess if the GIS Shapefiles of the project boundaries match the size of

the reported areas.

3. Assess that the reported grievances have been adequately addressed.
4. Assess the implementation of the project activities and monitoring of sustainability indicators as per the Sustainability Monitoring Plan developed at the project design phase.
5. Assess the ex-post measurement and calculation of carbon performance of the Project since 1 January 2015 till 28 February 2020 and compare the results with the estimated ex-ante CO_2-certificates.
6. Check if there is a performance shortfall scenario where the ex-post is lower than the ex-ante estimation of carbon credits.

1.2 Project Background

Hawaiian Legacy Hardwoods (HLH LLC) started plantation activity on the northern slopes of Mauna Kea on the Big Island of Hawai`i on land that is a part of Kukaiau (Cattle) Ranch in 2010. It aims to restore a biodiverse native forest with keystone species of the natural forest ecosystem formation as before the cattle ranch. HLH has leased 1109 Acres of Kukaiau Ranch for 60 years from the landowner and is developing and managing about 60% of the area for conservation with a mixture of native species and 40% for timber production from monoculture plantation of Koa species.

With the opportunity of generating validated and verified carbon credits from Afforestation/Reforestation (A/R) Project under the Gold Standard, the HLH designed and registered Gold Standard A/R Project for 50 years crediting period. The Project has successfully undergone for Initial Certification and Performance Certification by an Independent Validation and Verification Body (VVB) in 2015.

1.3 Level of assurance

The verification has been undertaken to a reasonable level of assurance, in compliance with the Gold Standard A/R Requirements V0.9 (Road Test).

2. Audit team details and credentials

2.1 Audit Team Composition

Our audit team comprises Dr Sunil Sharma (Audit Team Leader), Dr Helen Chandler (Audit Team Member) and Dr Adina Cirtog (Internal Reviewer). The roles and responsibilities of each Auditor are summarized below:

Auditor (Role)	Responsibilities
Sunil K Sharma (Audit Team Leader)	• Overseeing the audit process • Desk review of the project documents (technical and non-technical) • Field visit (cancelled due to COVID travel restriction. • Issuance of list of uncorrected errors and review of the responses • Prepare audit report
Helen Chandler (Audit Team Member)	• Desk review of the project documents (non-technical) • Issuance of list of uncorrected errors and review of the responses • Prepare audit report
Adina Cirtog (Internal Reviewer)	• Review of the audit report draft for ensuring Quality Assurance and Quality Control and adherence to company policy

2.2 Auditors' Qualifications and Experiences

Sunil Kumar Sharma, Audit Team Leader
Sunil is an expert in climate change mitigation. He is instrumental in working with Pangolin's team on forestry project audit under the Gold Standard and the Australian Government's Emissions Reduction Fund (formerly the Carbon Farming Initiative, or CFI). Sunil specializes in the Reducing Emissions from Deforestation and Forest Degradation (REDD+) mechanism. He is a REDD, Improved Forest Management (IFM) Methodology, and Jurisdictional Nested REDD Program expert under the Voluntary Carbon Standard Association (VCSA). He is also listed in Roster of Expert for Afforestation and Reforestation Methodology of the Clean Development Mechanism (CDM-UNFCCC). He was also a member of the Technical Advisory Board of Plan Vivo Standard. Sunil co-authored the Improved Forest Management-Logged to Protected Forests (IFM-LtPF) Methodology (VM00011) under the Verified Carbon Standard (VCS). He also led a team of scientists for developing a Woodland Rehabilitation Methodology under the CFI scheme of the Australian Government. Sunil has a PhD in Resource Management and Environmental Science from the Australian National University, Australia and a Master's degree in Tropical Forestry from Germany and a Master's degree in Sociology from Nepal. He has committed over 25 years of his life in natural resource

management with an extended experience on the impacts of human factors on natural resources and vice versa. He was engaged in REDD+ project eligibility and feasibility study, project design and development, advisory and capacity building of in-country partners in Brazil, Paraguay, Mozambique, Zimbabwe, Cambodia, Vietnam and Nepal. He held an adjunct academic position as Senior Lecturer at the School of Environment at Flinders University, South Australia (2013-2016). He was the Audit team leader and successfully completed verification of two A/R Projects under the Gold Standards.

Helen Chandler, Audit Team Member
Helen has worked in the carbon management sector since 2007. Following a role as a senior emissions auditor for greenhouse gas emissions audits, she moved into the area of carbon risk and opportunity, building a tool for assessing carbon exposure risk for Australian businesses. Research in carbon credit origination projects led to co-authorship of a Verified Carbon Standard (VCS)-approved methodology for Improved Forest Management-Logged to Protected Forests (IFM-LtPF). She has used this expertise to provide support for Pangolin Associates in assurance engagements for the former Carbon Farming Initiative and current Australian government NGER and ERF schemes. Helen now brings her carbon industry experience to energy audits for light commercial and small businesses. Helen holds a BSc from the University of Adelaide and a DPhil from the University of Oxford. She was an Audit team member on two A/R Projects which have successfully completed verification under the Gold Standard.

Adina Cirtog, Internal Reviewer
Adina has conducted numerous energy efficiency audits and assessments in accordance with AS/NZS 3598:2014 (Level 1, 2 & 3), and GHG Assessments across various industries and government sectors as well as assurance audits under the NGER. She is also a Certified Measurement and Verification Professional (CMVP) awarded by the Association of Energy Engineers (AEE) in conjunction with the Efficiency Valuation Organisation (EVO). Adina brings her knowledge in consulting and planning service

provisioning for technical equipment in building and processes as previously she was a design engineer in the Romanian branch for Fact GmbH (Germany). She developed digital plant construction designs for German companies covering electrical, ventilation, water and gas piping specifications. With over 8 years of experience in the field of energy and emissions auditing, Adina provides Pangolin Associates' clients with practical energy efficiency solutions.

Adina holds a PhD in Mechanical Engineering from Tokyo University of Agriculture and Technology, Japan. She holds Master's and Bachelor's Degrees of Power Systems Engineering (Electrical) from Politehnica University of Timisoara, Romania. This includes a year of study in the University of Stuttgart, Germany.

Adina's PhD further demonstrates her research expertise that complements her role as an Energy Auditor. She is a published author of several scientific articles in peer reviewed international journals.

As a student leader, Adina was actively involved in youth policies development through various NGO's. She was an Audit team member and conducted internal review of verification reports for two A/R Projects under the Gold Standard.

2.3 Auditor Code of Conduct Declaration

The Auditors are independent and have no conflict of interest or affiliations with the Project Owner, HLH, in financial and non-financial matters. Each Auditor has signed a separate form for Independence and Code of Conduct Declaration. Pangolin Associates has kept the signed declaration forms in the audit record keeping system.

3. Methods of verification

The Verification of the GS Project normally involves three complimentary methods: 1) Desktop Review, 2) Site Visit, and 3) Interview with the Project Staff and stakeholders. The next sections discuss Desktop Review and Interview method. Site visit by VVB was a mandatory requirement of the GS for verification to observe the project activities and interview with the project staff/worker and the stakeholders. For the verification of HLH Project, the Auditor scheduled a three-day site visit on 25th -27th March 2020. Because of worsening situation of COVID 19 and subsequent travel restriction imposed by the Australian Government, the PO and Pangolin Associates (VVB) decided to postpone the site visit on 12th March 2020. During the site visit, the Auditor had planned to visit all Modelling Units (MUs) to observe first hand – the

planting areas, species, growth status, site conditions and also re-measure trees in the randomly selected sample plots to assess the accuracy of the tree measurements and estimation of CO_2-e Fixation by the PO. Meeting/interviews with stakeholders and project staff/workers were also planned during site visit to verify the project activities and CO_2-e Fixation.

In response to the unprecedented situation of travel restrictions across the nations, the rule update from the GS (on 24th July 2020) has provided an alternative measure to VVB to replace site visit by remote audits. To this effect, the PO and Pangolin Associates (VVB) agreed to proceed with the remote audit and proposed the approaches to SustainCERT as per the decisions provided by GS Secretariat on the deviation request submitted by the PO on 1st May 2020. SustainCERT approved the following approaches to the remote audits for the Project:

1. Accept the inventory results into a desktop analysis without the auditor's plot re-measurement that would typically be undertaken as part of a field audit to the approach to corroborate the project's actual carbon stocking and to assess the accuracy of the ex-post measurements" for both the ex-post carbon in new area certification and the ex-post carbon in initially certified areas between 1/1/2015 and 28/2/2020,

   For this remote audit, the VVB applied the following methods to assess the ex-post measurement of the carbon stock and to verify the project's actual CO_2 Fixation:

   a) Check the inventory procedure and field data collection, compilation and analysis.
   b) Interview the inventory crew leader on the application of the inventory procedure in the field.
   c) Crosscheck the sample plot data in the calculation file against the field book datasheet for accuracy and completeness of the data transfer.
   d) Check every column in each tab in data analysis excel files for CO_2 Fixation and Carbon Performance calculation for the correct use of equations and parameters.

2. Undertake a qualitative assessment of recent satellite imagery to supplement interpretation of the ground-based inventory results analysed in approach 1 above, including aspects of plot location and planting area stratification.

   For this remote audit, the VVB applied a qualitative assessment of the high-resolution satellite imagery and the Google Earth to ensure the

accuracy of the MUs mapping by:

a) Check the MUs are located inside the eligible planting area.

b) Check the mapping of the MUs boundaries against the plantation boundary in the imagery so that the MU boundary aligns accurately with the outer edge of the plantation in the imagery.

c) Check the MUs do not include open spaces, exclusion areas and remnant vegetation.

d) Check if the MUs have experienced any disturbance or damage in the imagery.

e) Create the .kml file for each MU and import to the Google Earth to reconfirm accuracy of the MUs mapping and observe any disturbance or damage in the MUs.

3.1 Desk Review of Documents

The Auditors conducted a desk review of the submitted project information to assess the project's compliance with the requirements.

First, the project documents were checked for the completeness of the template documents and supporting documents for the Project's verification as per Gold Standard Afforestation/Reforestation (A/R) Requirements V 0.9 (Road Test). Second, the Auditors conducted a thorough review of information and data in the Project documents for consistency and accuracy against the requirements as set out by the Gold Standard. A list of the Project documents and supporting documents submitted by the PO for review is included in Annex 1. Third, any non-compliance and inconsistencies were compiled in a list of uncorrected errors and sent out to the PO to address and to take appropriate actions to resolve the errors. The uncorrected errors can include the following three categories:

(i) Corrective Action Request (CAR),
(ii) Forward Action Request (FAR) and,
(iii) Observation (OBS),

Lastly, the Auditors reviewed the Project's responses and drew the assertion on the compliance of the project with the GS requirements.

3.2 Interview with the Project Staff/workers

In the absence of the site visit, the Auditor organized interviews via Zoom technology with the Project staff who were involved in the project implementation, monitoring and forest measurement.

Darrell, Payton and Dennis were interviewed on 4th September 2020 while Hanna was interviewed on 10th September 2020 from Hawaii. The specific roles of these staff are presented below:

Personnel	Roles
Darrell Fox (Chief Operating Officer)	Responsible for all field and nursery operations on Hawaii Island, including at a high level: • Raising sufficient seedlings for planned operations, • Maintaining vehicles in good working order, • Ensuring adequate road and field access, • Site preparation for planting, • Fencing and ungulate control, • Planting and tending, • Plantation silviculture, • Oversight of investor tours and planting tours, • Data collection.
Dennis Cohen (Operations Forester)	Responsible for field work and reporting to the COO: • Fence erection and repair • Road repair • Tree planting • Herbicide application • Fertilising • Tree felling/clearing
Payton Miller (Operations Forester)	
Hannah Gould (Planning and Operations Support Officer)	Reporting for field data collection and reporting to the COO: • Field measurements • Data collection and handling • Nursery work • Other field work as necessary.
Andrew Callister, (Principal, Treehouse Consulting)	Contracted for the following works: • Assist with preparation of documents for certifications, and • Provide additional expertise and capacity for managing Project GS-3260

During the interview, the Auditor asked them to describe their respective roles in the project implementation from nursery operation producing seedlings to plantation site preparation, weeding, planting and maintenance of fence for protection of plantation areas and monitoring. The approach to forest inventory was discussed, including plot locations, tree measurement, recording data and storage. The interviewees were also asked about the work conditions, worker's rights, work safety and any grievances input to the Project. Information provided by the interviewee were cross-checked with the information provided project documents and monitoring reports.

HLH Project has engaged Treehouse Consulting to assist with the preparation of documents for certifications, and provide additional expertise and capacity for managing Project GS-3260. Dr Andrew Callister, Principal of Treehouse Consulting was the first contact person on behalf of the PO and managed the

verification process by providing the Project documentation, additional documentation request and also a response to the list of uncorrected errors including CARs, FARs and OBS. During the period of this verification, the Audit team communicated with Andrew on several occasions over Zoom calls. His role was pivotal to this verification process for clarifying the issues, organizing staff interview and explaining the growth modelling and calculation of long-term and ex-post carbon fixation.

3.3 Additional evidences and queries

For the remote audit, the Auditor prepared a list of additional supporting documents or pieces of evidence and provided to the PO to demonstrate the planting activities and monitoring in the Project Area in the absence of site visits. The list included photos with GPS location for evidence of the planting areas, nursery operation, seedling productions, fieldwork and nursery records on species and number of seedling produced and any documentary evidence to support nursery operation. These documents were useful to collect information on the project activities and triangulate information with the project documents to get a reasonable assurance on the Project to verify the $CO_{2\text{-}e}$ Fixation.

In addition, to review of the documents and cross-check through articulating the various evidence, the Auditor Team Leader and the Project Consultant (Dr Andrew Callister) had a zoom call for over two hours to run through the excel files explaining the growth modelling, calculation of carbon fixation and long-term CO2 from rotation forestry. Following the PO's CAR responses, the Auditor sent out queries via emails requesting further clarification and evidence. The PO provided the explanation and additional documents (where necessary), which were taken into account to resolve the issues raised in this verification.

4. Number and list of Clarifications Request

4.1 Corrective Action Requests (CAR)

CAR #:	CAR 01/20
Occurrence in the Document(s)	*GS3260_2.1_Key Project information_Revised Apr15.pdf; GS3260_2.1_Key Project information_Revised FEB2020.pdf*
Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements
Description of an issue to be addressed:	
HLH Project identified conservation and timber production as project activities and allocated 75% and 25%, respectively to these activities as per the Key Project Information (KPI) submitted for Initial Certification in 2015. We noticed that the updated KPI document submitted for this audit has changed the area allocation 60% to conservation and 40% to timber production activity.	
Suggested action required:	
Please explain and/or justify; (a) the reasons for changing the area allocation for conservation and timber production activities since the initial certification; (b) the decision to a new area allocation of 60% to conservation and 40% to timber production activity; (c) the impact on the financial viability of the project due to the change in the areas for conservation and timber production activity; (d) the impact on the long-term Carbon Fixation and Carbon Certification from the project due to the change in the areas for conservation and timber production activity; (e) the impact on the sustainability monitoring due to the change in the areas for conservation and timber production activity.	
Project Owner's response:	
(a) For environmental sustainability, timber production activities are limited to land that is relatively flat and without rocky outcrops. The initial survey of the project area indicated that the proportion of land conforming with these requirements was around 25%. However, as each field was examined more carefully prior to planting, it was discovered that the proportion of land suitable for timber production was overall greater than anticipated. (b) 40% timber production area was not stipulated as a new target. Rather, this value was approached via the annual sequence of allocating maximum land area that could sustainably support timber production. (c) The increase in timber production area proportion from 25% to 40% (the actual mapped-area proportion in September 2020) improves the financial position of the project substantially, due to the increase in investment revenues. At 25% timber production area, the net present value of the whole project is estimated at -$1,396,000, whereas at 40% timber production area, the NPV of the whole project is estimated at -$501,000 (both estimates using an 8% discount rate). The difference means that a substantially smaller deficit must be made up by donations and other financial means. (d) With the new thinning regimes, the Legacy model produces an estimated 916.5 t CO2e/ha in a 50-year period, compared with 791.1 t CO2e/ha by the Timber model	

(*GS3260_5.7.10_CO2-Fixation workbook_SEPT2020.xlsx*). Increasing the Timber:Legacy area ratio will therefore result in an overall decrease in project carbon. The workbook *CO2-Fixation workbook_Timber-Legacy_ratio_scenarios.xlsx* (found in the *2020 Audit_CAR responses folder*) includes project carbon calculation pages to compare these two scenarios under the new thinning regime. At 40% Timber, the total project carbon is expected to be 266,151 t CO2e, compared with 276,072 t CO2e at the initially expected 25% Timber. The difference of ~ 10,000 t CO2e represents a 3.6% reduction in carbon fixation due to the greater proportion of Timber areas (see cell L30 on the *MU Summary_Project_25%* worksheet of *CO2-Fixation workbook_Timber-Legacy_ratio_scenarios.xlsx*).

(e) The field-based sustainability monitoring proposed at initial certification is related to re-establishment of native biodiversity. The actual biodiversity improvements realised by the project will not be materially different due to an increase in timber production areas from 25% to 40%, as the same number of supplementary species and seedlings of those species will be planted in the project. The monitoring of biodiversity will be according to the same plan, in which targeted legacy areas and zones around remnant koa will be sampled.

Additional documents provided by the Project Owner:

GS3260_5.7.10_CO2-Fixation workbook_SEPT2020.xlsx
CO2-Fixation workbook_Timber-Legacy_ratio_scenarios.xlsx

Auditor's review of the PO's response:

a) The PO provided the justification for the change in the area allocation to 40% and 60% for timber production and conservation area, respectively. The reason for increase in the timber production area is attributed to availability of more flat land in the project area suitable for timber production identified during the actual plantation.
b) The area allocation to timber production increased because the project intend to allocate maximum area to sustainable timber production.
c) The increase in the timber production area positively impacted the financial position of the project as demonstred by comparing the NPV at the timber production scenarios of 25% and 40%.
d) The average long-term carbon stock in the legacy and timber production were 916.5 t CO2e/ha and 791.1 t CO2e/ha, respectively.
e) The PO explained that there will be no impact on the sustainability monitoring due to change in the area allocation for legacy and timber production.

Conclusion	The CAR 01/20 is CLOSED.

CAR #:	CAR 02/20
Occurrence in the Document(s)	GS3260_2.1_Key Project information_Revised Apr15.pdf GS3260_2.1_Key Project information_Revised FEB2020.pdf
Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements

Description of an issue to be addressed:

We noticed a change in the planned thinning regime for Koa in years 8, 15 and 21 in the Initial Certification (2015) to years 8-13, 15-17 and 21 in this verification (2020).

Suggested action required:
Please explain and/or justify the change in the planned thinning regime for Koa and the impacts on the project outcomes including long-term Carbon Fixation, Carbon Certification and sustainability monitoring.
Project owner's response:
The most up-to-date thinning regime is actually 10 years (to 400sph) and 17 years (to 150sph) for Timber management areas and 13 years (to 400sph) for Legacy management areas. This has been altered since preparing the recertification documentation in February 2020 in order to maximise the carbon fixed in both management systems. This decision was made after the following activity. Eleven combinations of four thinning regimes for Timber and four thinning regimes for Legacy were applied over a hypothetical 50-year crediting period to 154 ha of Timber and 220 ha of Legacy (assumed for the sake of simplicity to be planted in a single year). See *GS3260_5.7.9_HLH_InventoryResultsGrowthModel_2020_RevisedSEP2020.xlsx*. The worksheet *Thinning Schedules* contains the thinning schedules applied, including '2015' for each management system, which were the schedules assumed at the Initial Certification. For each of the 11 thinning schedule combinations, the Vanclay Growth Model was applied to predict the growth of hypothetical Timber and Legacy trees. Results are compiled on the worksheet *C fixation | thinning schedule*. It was found that the thinning schedule that was applied to Timber system made little difference to total project carbon fixation, whereas the thinning schedule. On the other hand, the thinning schedule that was applied to the Legacy areas made a very large difference to total project carbon. Regimes with 'heavier' density retained (lighter thinnings) produced substantially greater estimates of carbon fixation. See cells D18:G21 of worksheet *C fixation | thinning schedule*. The changed thinning schedule should have no impact on carbon certification or sustainability monitoring.
Additional documents provided by the Project owner:
GS3260_5.7.9_HLH_InventoryResultsGrowthModel_2020_RevisedSEP2020.xlsx
Auditor's review of the PO's response:
The PO explained that the thinning regime was changed to maximize the carbon fixation from the Project Area over the crediting period. The PO demonstrated the increase in the carbon fixation by comparing the previous thinning regime and the new thinning schedule in the timber and legacy model. The Auditors checked the estimations and agreed with the findings.

Conclusion	This CAR 01/20 is CLOSED.

CAR #:	CAR 03/20
Occurrence in the Document(s)	*GS3260_2.1_Key Project information_Revised FEB2020.pdf* *GS3260_3.5_Project Participants & Secured Titles_FEB2020.pdf*
Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements
Description of an issue to be addressed:	
KPI (2020) has added Treehouse Forest Research (TFR) as a new project participant in addition to the project participants listed in KPI (2015) including Four Seasons Hotel and Resorts, Natural	

Resources Conservation Service (NRCS) through the Hawai`i Conservation Reserve Enhancement Program (CREP) and the USDA Forest Service – PSW Research Station – Institute for Pacific Islands Forestry, and local landowners. In the Project Participants & Secured Titles (2020) document, Treehouse Forest Research (TFR) is the only organization listed as a project participant and there is no mention of the other organisations that were listed in the KPI (2020).
Suggested action required:
(a) The PO is requested to explain what the 'Project Consultant' role of TFR in the project entails and provide evidence of any contractural arrangement between the Project Owner and TFR. (b) Please update KPI (2020) or Project Participants & Secured Titles (2020) ensuring consistency of information.
Project Owner's response:
(a) Treehouse Forest Research (TFR) is engaged to assist with preparation of documents for certifications and to provide additional expertise and capacity for managing Project GS-3260. The contractual agreement between HLH and TFR is now included with project participant documents (*GS3260_3.5.6_LC-TFR_agreement_May2019.pdf*). (b) *GS3260_2.1_Key Project Information_SEPT2020.pdf* and *GS3260_3.5_Project Participants & Secured Titles_SEPT2020.pdf* have been updated to provide up-to-date and consistent information.
Additional documents provided by the Project Owner:
GS3260_3.5.6_LC-TFR_agreement_May2019.pdf *GS3260_2.1_Key Project Information_SEPT2020.pdf* *GS3260_3.5_Project Participants & Secured Titles_SEPT2020.pdf*
Auditor's review of the PO's response:
The PO provided the service engagement agreement signed between Treehouse Forest Research (TRF) and HLH and updated the relevant template documents with all the participants.

Conclusion	This CAR 02/20 is CLOSED.

CAR #:	CAR 04/20
Occurrence in the Document(s)	*GS3260_2.1_Key Project information_Revised FEB2020.pdf;* *GS3260_5.5_Baseline_FEB2020.pdf;*
Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements

Description of an issue to be addressed:
We noticed a change in the project eligible planting area from 336.7 ha in the Initial Certification to 384.6 ha in this verification. Also note that the 'Baseline' template-2020 reported an eligible plantation area of 220.6 ha.
Suggested action required:
1. Please explain and/or justify: (a) the increase in the eligible area from the Initial Certification to this verification, (b) that the increase in the eligible area is located within the project area i.e. 485.8 ha where the

PO has legal right for carbon credits for the project crediting period.
Project Owner's response:
Note that this question is also addressed in CAR 16/20 part c). (a) Previous estimates of Eligible Planting area suffered from: • Poorly georeferenced imagery that was used for digitising, • Less precise mapping of remnant vegetation and road and building infrastructure, and • An error in spreadsheet *MU Summary_Project* of *GS3260_5.7.2_Growth model and CO2-Fixation workbook_Revised Feb15.xlsx*, where cell C19 contained a formula '=sum(C12:C17)' when it should have been '=sum(C12:C18)'. This error excluded 42.6 ha from the projected future Timber plantings and also the estimate of Eligible Planting Area. Note that the present calculation of Eligible Planting Area is 395.2 ha, and this is considered the best estimate. It has been derived from shapefile *EligiblePlantingArea_SEPT2020.shp* and is reported in Item (e) of *GS3260_2.1_Key Project Information_SEPT2020.pdf*. (b) There has been no increase in the eligible area in the field. All parts of eligible planting area are contained within the Project Area and within the lease area. This can be seen by overlaying LeaseArea_SEPT2020.shp and ProjectArea_SEPT2020.shp with EligiblePlantingArea_SEPT2020.shp.
Additional documents provided by the Project Owner:
EligiblePlantingArea_SEPT2020.shp *GS3260_2.1_Key Project Information_SEPT2020.pdf* LeaseArea_SEPT2020.shp ProjectArea_SEPT2020.shp EligiblePlantingArea_SEPT2020.shp
Auditor's review of the PO's response:
a) The Auditor checked MU Summary_Project of GS3260_5.7.2_Growth model and CO2-Fixation workbook_Revised Feb15.xlsx and confirmed that there was a mistake while summing up the areas for Timber Production. The eligible planting area reported in the initial certification did not include the MU '16T' (Timber Production) of 42.4 ha and therefore, reported 336.7 ha instead of 379.3 ha. The Auditor notes that the total eligible planting area obtained by adding the area of MU 16T 379.3 ha did not match with the eligible planting area (384.6 ha) reported in the previous version of the KPI. However, the updated KPI document mentioned eligible planting area of 395.2 ha based on the revised lease area map which is the boundary for the project area and excluding the remnant vegetation (38.36 ha), infrastructure area (13.03 ha) and future building area (1.7 ha). b) The overlay of the eligible planting area over the lease area and project area map showed that the eligible planting area is entirely located within the project area.

Conclusion	The CAR 04/20 is CLOSED.

CAR #:	CAR 05/20
Occurrence in the Document(s)	*GS3260_4.1_Additionality_FEB2020.pdf; GS3260_4.1.5_Final Kulaiau Lease Agreement.docx*
Reference:	GS A/R v0.9; Chapter 4. Additionality
Description of an issue to be addressed:	
Section 3(a) of *GS3260_4.1_Additionality_FEB2020.pdf* refers to 'Paragraph 4(k)' in *GS3260_4.1.5_Final Kulaiau Lease Agreement.docx* which is inaccurate.	
Suggested action required:	
Please update *GS3260_4.1_Additionality_FEB2020.pdf* with the correct reference in the lease agreement document.	
Project Owner's response:	
This is the result of a typographical error: 'Paragraph 4(k)' is now replaced with 'Paragraph 7(k)' in Section 3(a) of *GS3260_4.1_Additionality_FEB2020.pdf*	
Additional documents provided by the Project Owner:	
None added	
Auditor's review of the PO's response:	
The PO updated the document (*GS3260_4.1_Additionality_FEB2020.pdf*) with correct information.	
Conclusion	The CAR 05/20 is CLOSED.

CAR #:	CAR 06/20
Occurrence in the Document(s)	*GS3260_5.5_Baseline_FEB2020.pdf; GS3260_5.5_Baseline_Revised Feb15_Changes saved.pdf*
Reference:	GS A/R v0.9; Chapter 5.5 Baseline
Description of an issue to be addressed:	
The 'Baseline' template 2015' stated that the project area was stratified into eight modelling units (MUs) and the updated 'Baseline' in 2020 included an additional seven modelling units in the New Area. However, section 2(b) referred to '17' MUs which is inaccurate.	
Suggested action required:	
Please update *GS3260_5.5_Baseline_FEB2020.pdf* with the correct number of MUs in the project area.	
Project Owner's response:	
The 2015 Baseline documentation contained a typographic error in section 1a) in reference to 'eight' modelling units. In other parts of the same document 'Stratum ID' was referred to as 'All ten MU's', which is correct because the initial certification covered MU's 10-L, 10-T, 11-L, 11-T, 12-L, 12-T, 13-L, 13-T, 14-L, and 14-T.	

Additional documents provided by the Project Owner:	
GS3260_5.5_Baseline_SEPT2020.pdf	
Auditor's review of the PO's response:	
The PO acknowledged the typographical error and updated the document GS3260_5.5_Baseline_SEPT2020.pdf. a) We understand that the PO had undertaken new planting activity in the eligible planting areas within the existing project area after the initial certification in 2015. These planting areas were divided into eight homogenous area and assigned as distinct Modelling Units. Since the planting activities occurred in the validated eligible planting area within the project area, no new areas have been added to the project after its initial certification. Therefore, 'New Area Certification' is not required for this project. b) On page 2 of GS3260_5.5_Baseline_SEPT2020.pdf the elibible planting area is 268.4 ha which is not accurate.	
Conclusion	CAR 19/20 is created.

CAR #:	CAR 07/20
Occurrence in the Document(s):	*GS3260_5.5_Baseline_FEB2020.pdf;* GS3260_2.1_Key Project information_Revised FEB2020.pdf
Reference:	GS A/R v0.9; Chapter 5.5 Baseline
Description of an issue to be addressed:	
We noticed that the *GS3260_5.5_Baseline_FEB2020.pdf* reported eligible plantation area of 220.6 ha on page 2 and 300.6 ha on page 3 for all 17 MUs, in contrary to 384.6 ha in the *GS3260_2.1_Key Project information_Revised FEB2020.pdf*. The document also estimated total non-tree biomass of 2489 tCO_2 and 3388 tCO_2 attributing carbon stock of 13.0 tCO_2/ha and 11.27 tCO_2/ha on page 2 and 3 of the *GS3260_5.5_Baseline_FEB2020.pdf*.	
Suggested action required:	
Please check the eligible planting area, carbon stock per hectare and the estimation of baseline non tree carbon stock in the *GS3260_5.5_Baseline_FEB2020.pdf* and update the data to ensure the consistency of the data across all the documents.	
Project Owner's response:	
The baseline template has been updated with current area estimates from recent mapping, the addition of a new MU (15-Ldense), and confirmed values for baseline carbon.	
Additional documents provided by the Project Owner:	
GS3260_5.5_Baseline_SEPT2020.pdf	
Auditor's review of the PO's response:	
The Auditor checked the updated GS3260_5.5_Baseline_SEPT2020.pdf and confirmed that the values were accurate and consistent. We noted that a new MU (15-Ldense) has been added with a total of 18 MUs to be verified in this audit whereas the previous document had 17 MUs.	

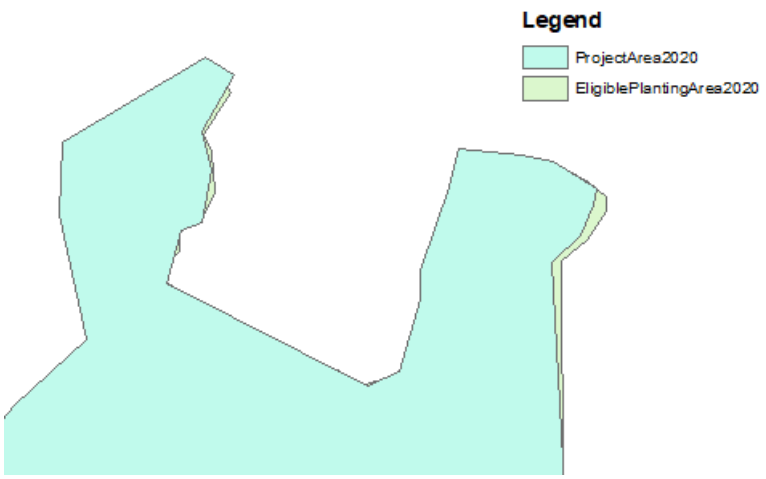
Conclusion	The CAR 07/20 is CLOSED.

CAR #:	CAR 08/20
Occurrence in the Document(s):	*GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx; GS3260_5.7.8_HLH growth model report_FEB 2020.docx*
Reference:	GS A/R v0.9; Chapter 5.7 CO2-Fixation
Description of an issue to be addressed:	
We observed descrepancies in the number of sample plots and the trees measured in these plots. Whilst Table 1 in *GS3260_5.7.8_HLH growth model report_FEB 2020.docx* had 235 plots, Tab '2019-20 data' had 246 plots and tab 'Plot-MU Table' had 243 plots in *GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx*. The number of trees measured were 2,393 in Tab '2019-20 data' and 2,389 trees in tab 'AC_data2019-20' in *GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx*.	
Suggested action required:	
Please check the discrepancies in the data and update with the accurate data across the documents ensuring consistency and accuracy.	
Project owner's response:	
Please refer to *GS3260_5.7.9_HLH_InventoryResultsGrowthModel_2020_RevisedSEP2020.xlsx*. The field inventory was conducted prior to re-mapping the project in September 2020, which resulted in 47 inventory plots being re-allocated between MUs or falling outside of planted areas. Additionally, one plot was correctly located within MU 13-L but it was decided not to include 13-L in accounts of ex-post carbon fixation. Therefore, a total of 48 plots and 370 trees were measured – and included in the 2387-tree dataset found on worksheets *AC_data2019-20* and *2019-20 data* (noting that tree 2 in plot 12-L-3 (line 1285 of *2019-20 data*) was excluded from *AC_data2019-20* under suspicion that it might have been a pre-existing tree) – but were not included in the analysed data. The total analysed dataset comprises 199 plots (rows 2 to 200 on *PlotSummary*), all of which were confirmed to be accurately located within their respective MUs (see *2020Plots_SEPT2020.shp* and supporting shapefile files).	
Additional documents provided by the Project owner:	
GS3260_5.7.9_HLH_InventoryResultsGrowthModel_2020_RevisedSEP2020.xlsx *2020Plots_SEPT2020.shp*	
Auditor's review of the PO's response:	
We checked the impact on the CO2 fixation due to the exclusion of the 36 sample plots. The total CO2 fixation were 30,935 tCO2 and 30,949 tCO2 for the calculations based on 235 and 199 sample plots, respectively. The net difference of CO2 fixation was 14 tCO2 or 0.05% and was found to be insignificant to the significance threshold of 5%. A large tree of 25.5 cm dbh was logically excluded as that may be a pre-existing tree in the plot. Why was a plot in MU13-L excluded? How did it impact on the carbon stock calculation?	

Conclusion	CAR 20/20 is created.

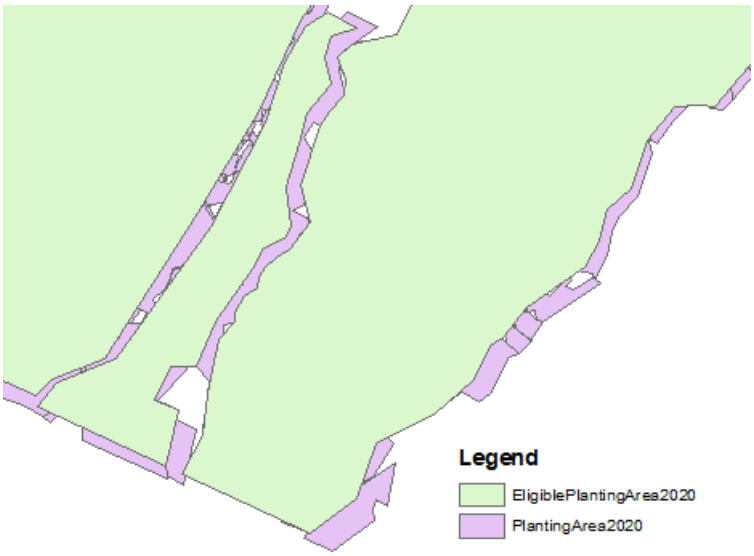
CAR #:	CAR 09/20
Occurrence in the Document(s):	*GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx*
Reference:	GS A/R v0.9; Chapter 5.7 CO2-Fixation
Description of an issue to be addressed:	
In tab 'PlotSummary', col 'M' calculates the value for β_2 using equation $D = \beta_2(H\text{-}1.3)/\ln N$ based on Vanclay et al (2010) in *GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx*. However, the equation used a constant value of 4.3 instead of 1.3 in the equation.	
Suggested action required:	
Please check the equation applied to estimate the value of β_2 ('VanclayBeta2Hat') in column 'M' in tab 'PlotSummary' and update with the correct values. Please rerun and update the growth model applying correct values of β_2 in tab 'MU summary & DBH growthModel' in *GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx* and *GS3260_5.7.10_CO_2-Fixation workbook_AUG2020.xlsx.* Please explain any impact on the DBH growth model due to change in the values of β_2 and on the calculation of CO_2 Fixation in *GS3260_5.7.10_CO_2-Fixation workbook_AUG2020.xlsx*.	
Project Owner's response:	
The calculation is correct because height was measured in feet with breast height at 4.3 feet (1.3 metres, as presented by Vanclay et al 2010). The particular values of beta1 and beta2 used in this workbook are correct for height in feet and diameter in inches.	
Additional documents provided by the Project Owner:	
No additional documents	
Auditor's review of the PO's response:	
The Auditor checked the reference (Vanclay et al., 2010) and confirmed that the equation $D = \beta_2(H\text{-}1.3)/\ln N$ applies the height data in meters. While using the equation, the PO used the height data in feet and therefore changed 1.3 to 4.3.	
Conclusion	The CAR 09/20 is CLOSED.

CAR #:	CAR 10/20
Occurrence in the Document(s):	*EligiblePlantingArea2020.shp; ProjectArea2020.shp*
Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements
Description of an issue to be addressed:	
When the eligible planting area map (EligiblePlantingArea2020.shp) was overlaid on the Project Area Map (ProjectArea2020.shp), the boundary of the eligible area occurred outside the Project	

Area. The eligible planting area is part of the project area and must occur inside the latter's boundary.
 *Figure 1: This map shows the boundaries of the eligible planting area and the project area where the eligible planting area occurs outside the project area.*
Suggested action required:
Please check and update these maps ensuring that the eligible planting area lies inside the project area.
Project Owner's response:
Please note that this has been addressed in CAR 16/20 also. Eligible planting area (*EligiblePlantingArea_SEPT2020.shp*) lies completely within Project Area (*ProjectArea_SEPT2020.shp*).
Additional documents provided by the Project Owner:
EligiblePlantingArea_SEPT2020.shp and associated mapping files *ProjectArea_SEPT2020.shp* and associated mapping files
Auditor's review of the PO's response:
The PO revised the project area map (ProjectArea_SEPT2020.shp) confirming the boundary within the lease area map. The overlay of the eligible planting area map on the project area showed the EPA is located within the project area.

Conclusion	The CAR 10/20 is CLOSED.

CAR #:	CAR 11/20
Occurrence in the Document(s):	*EligiblePlantingArea2020.shp; PlantingArea2020.shp*
Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements
Description of an issue to be addressed:	

When the eligible planting area map (EligiblePlantingArea2020.shp) was overlaid on the Planting Area Map (PlantingArea2020.shp), the boundary of the planting area occurred outside the eligible planting area. The planting area is part of the eligible planting area and must occur inside the latter's boundary.
 *Figure 1: This map shows the boundaries of the planting area and the eligible planting area where the planting area occurs outside the eligible planting area.*
Suggested action required:
Please check and update these maps ensuring the planting area lies inside the eligible planting area.
Project Owner's response:
Please note that this has been addressed in CAR 16/20 also. Planting area (*PlantingArea_SEPT2020.shp*) lies completely within Eligible Planting Area (*EligiblePlantingArea_SEPT2020.shp*).
Additional documents provided by the Project Owner:
EligiblePlantingArea_SEPT2020.shp and associated mapping files *PlantingArea_SEPT2020.shp* and associated mapping files
Auditor's review of the PO's response:
The PO revised the planting area map, eligible planting area map and the project area map. The overlay of the planting area map, eligible planting area map and the project area showed the planting area is located within the EPA and the project area.

Conclusion	The CAR 10/20 is CLOSED.

CAR #:	CAR 12/20
Occurrence in the Document(s):	*EligiblePlantingArea2020.shp; PlantingArea2020.shp*

Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements

Description of an issue to be addressed:

We acknowledge the receipt of additional documents including updated maps and area calculations. When the areas were recalculated using ArcGIS 10.2, we noticed that the MUs' areas were not matching (Please refer to Table 1). Noting that the MUs areas were not reconciling between AREA-May2020, AREA-Aug2020 and the Auditor's recalculation, the PO is required to revisit the MUs area calculation after addressing CARs 10 and 11.

MU	AREA-May2020	AREA-Aug2020 (ha)	Total-PD (ha)	Auditor-2020 (ha)	Auditor-Total Area (ha)	Difference (ha)
10-T	7.0	7.1		7.06		
11-T	17.1	18.3		18.12		
12-T	38.1	39.2		38.62		
13-T	30.2	28.1		27.82		
14-T	16.4	18.1		16.55		
15-T	15.1	15.2				
16-T	10.6	10.1		not calculated		
17-T	11.6	11.6		not calculated		
18-T	4.0	3.9	129.9	3.88	112.1	
21-T	4.5	4.5				
10-L	5.0	5.5		5.43		
11-L	11.1	12.4		10.41		
12-L	56.8	54.5		52.03		
13-L	35.8	29.8		29.55		
14-L	14.2	12.7		12.06		
15-L	18.5	18.6		18.4		
16-L	1.1	1.0		0.95		
18-L	8.0	4.9	139.3	4.88	133.7	
21-L	23.8	23.4				
22-L	35.3	41.7				
23-L	20.4	20.3				
Total Timber	154.5	156.2	129.9		112.1	17.9
Total Legacy	230.1	224.8	139.3		133.7	5.6
Total MU	**384.6**	**380.9**				

Table 1: Auditor recalculated area (col-4) of MUs using the shapefiles provided by the PO.

Suggested action requhjired:

The PO is requested to revisit the MUs area calculation after addressing CARs 10 and 11 ensuring that the total planting area and the areas of all MUs are the same.

Project Owner's response:

MU area calculations were revisited. They are tabulated on *PolygonAreas_SEPT2020.xlsx.*

Additional documents provided by the Project Owner:

PolygonAreas_SEPT2020.xlsx

10-L_SEPT2020.shp and associated mapping files
10-T_SEPT2020.shp and associated mapping files
11-L_SEPT2020.shp and associated mapping files
11-T_SEPT2020.shp and associated mapping files
12-L_SEPT2020.shp and associated mapping files
12-T_SEPT2020.shp and associated mapping files
13-L_SEPT2020.shp and associated mapping files
13-T_SEPT2020.shp and associated mapping files
14-L_SEPT2020.shp and associated mapping files
14-T_SEPT2020.shp and associated mapping files
15-L_SEPT2020.shp and associated mapping files
15-Ldense_SEPT2020.shp and associated mapping files
15-T_SEPT2020.shp and associated mapping files
16-L_SEPT2020.shp and associated mapping files

16-T_SEPT2020.shp and associated mapping files *17-T_SEPT2020.shp* and associated mapping files *18-L_SEPT2020.shp* and associated mapping files *18-T_SEPT2020.shp* and associated mapping files
Auditor's review of the PO's response:
The PO updated the MUs area map and recalculated the MUs areas provided in 'PolygonArea_SEPT2020.xlsx'. The areas were confirmed by checking the areas of the MUs combined into a single map and then a calculation of the total areas of 366.6 ha which matched with the summation of the MUs area in the excel file.

Conclusion	The CAR 12/20 is CLOSED.

CAR #:	CAR 13/20
Occurrence in the Document(s):	*EligiblePlantingArea2020.shp; PlantingArea2020.shp; ProjectArea2020.shp*
Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements

Description of an issue to be addressed:
The Auditor had an issue while estimating the total project area, eligible planting area and the total planting area using the relevant shapefiles (*ProjectArea2020.shp ; EligiblePlantingArea2020.shp; PlantingArea2020.shp)* included in the additional documents.
Suggested action required:
1. The PO is requested to calculate the areas of the project, eligible planting area and the planting area 2020 in the attribute table and ensure that the areas are the same as reported in KPI template 2020. 2. The PO is also requested to provide a map (shapefile) of the area leased by HLH project for implementing the A/R Project.
Project Owner's response:
(a) *GS3260_2.1_Key Project Information_SPET2020,* item (e) states: 'The project area is 1109 acres (448.8 ha)… a total 395.2 ha is designated as eligible planting area for the entire project. 268.4 ha has been planted to this point in time, out of a total 366.6 ha that is expected to be planted by the end of 2024'. These area statistics can be validated by examining attribute tables associated with shapefiles *ProjectArea_SEPT2020.shp*, *EligiblePlantingArea_SEPT2020.shp,* and *PlantingArea_SEPT2020.shp*, and Cell C22 of worksheet *MU Summary_Certification* in *GS3260_5.7.10_CO2-Fixation workbook_SEPT2020.xlsx.* (b) The requested shapefile is provided as *LeaseArea_SEPT2020.shp.*
Additional documents provided by the Project Owner:
GS3260_2.1_Key Project Information_SPET2020 *ProjectArea_SEPT2020.shp*

EligiblePlantingArea_SEPT2020.shp *PlantingArea_SEPT2020.shp* *GS3260_5.7.10_CO2-Fixation workbook_SEPT2020.xlsx* *LeaseArea_SEPT2020.shp*
Auditor's review of the PO's response:
The PO provided the shapefiles of the project area, eligible planting area and the planting areas and the areas were checked and confirmed to match the areas calculated by the PO. The KPI document is updated with the accurate areas. The PO provided the lease area map based on the boundary map included in the lease agreement with an area of 1109 ha.

Conclusion	The CAR 13/20 is CLOSED.

CAR #:	CAR 14/20
Occurrence in the Document(s):	*GS3260_5.7.10_CO2-Fixation workbook_AUG2020.xlsx; GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx*
Reference:	GS A/R v0.9; Chapter 5.7 CO2-Fixation

Description of an issue to be addressed:
Column 'G' in tab 'MU_Summary_Certification' in *GS3260_5.7.10_CO2-Fixation workbook_AUG2020.xlsx* uses the the long-term CO2 fixation- rotation forestry average of 33 tCO2/ha to estimate the carbon fixation for the 134 and 296 trees harvested at years 12 and 20 respectively. Since these trees are harvested and used, the assumption of 100% of carbon into long-term CO2 fixation may not be conservative. Notably, some parts of trees cannot be used for long-term harvested wood and are used in the short-term, releasing carbon to the atmosphere immediately.
Suggested action required:
The PO is requested to explain and justify that the assumption to account carbon in the harvested trees as long-term carbon fixation is conservative.
Project Owner's response:
The long-term carbon fixation estimate does not include any consideration of carbon in harvested products. The 'Long-term CO2-fixation - conservation forest (t/ha)' statistic is the total of 50-year average standing CO_2e in each rotational cohort of trees. This procedure follows the Gold Standard requirements for calculating CO2 fixation in rotational forests.
Additional documents provided by the Project Owner:
Auditor's review of the PO's response:
The PO accounted for the rotation forestry carbon of 6 and 132 tCO2 in the legacy and timber model by taking the average of the carbon fixation over the 50 years and the calculation is provided in the tab 'CO2-per-year by MU' and 'MU Summary_Project' of *GS3260_5.7.10_CO2-Fixation workbook_SEPT2020.xlsx*. Thus the accounting of carbon fixation under rotation forestry conforms to the requirement in the methodology.

Conclusion	The CAR 14/20 is CLOSED.

CAR #:	CAR 15/20
Occurrence in the Document(s):	*GS3260_5.7.10_CO2-Fixation workbook_AUG2020.xlsx; GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx; GS3260_5.7.1_HLH Inventory for Timber MUs 2010-12_Revised Feb15.xlsx*
Reference:	GS A/R v0.9; Chapter 5.7 CO2-Fixation
Description of an issue to be addressed:	
GS3260_5.7.10_CO2-Fixation workbook_AUG2020.xlsx & GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx compile the field data and apply models to estimate the long-term carbon fixation from the project over the crediting period. We noted that the estimation of ex-post carbon was presented in *GS3260_5.7.1_HLH Inventory for Timber MUs 2010-12_Revised Feb15.xlsx* in the last verification (2015). As the file is not found in the audit pack, the estimation of carbon sequestered cannot be verified.	
Suggested action required:	
The PO is requested to provide an estimation of the carbon to be verified in this verification.	
Project Owner's response:	
GS3260_5.7.1_HLH Inventory for Timber MUs 2010-12_Revised Feb15.xlsx has been placed in the audit pack, in folder *5.7 CO2 Fixation.*	
Additional documents provided by the Project Owner:	
GS3260_5.7.1_HLH Inventory for Timber MUs 2010-12_Revised Feb15.xlsx	
Auditor's review of the PO's response:	
As per the Auditor's request the PO submitted the document *GS3260_5.7.1_HLH Inventory for Timber MUs 2010-12_Revised Feb15.xlsx.*	
Conclusion	The CAR 15/20 is CLOSED.

CAR #:	CAR 16/20
Occurrence in the Document(s)	*LeaseArea.shp; ProjectArea2020.shp; EligiblePlantingArea2020.shp; PlantingArea2020.shp; Infrastructure2020.shp; GS3260_2.1_Key Project Information_Revised Apr15.pdf; GS3260_2.1_Key Project Information_FEB2020.pdf*
Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements
Description of an issue to be addressed:	
The list of uncorrected errors (R1.0) issued CAR 04/20, 10/20 and 11/20 on inconsistency and inaccurate mapping of the Project Area, Eligible Planting Area and Planting Area. The PO submitted the updated geospatial datasets (Version 3) and the review of these datasets in ArcGIS 10.2. The major findings of the review are as follows:	

a) The geospatial dataset *LeaseArea.shp* for the lease area was received with a total area of 449 ha whereas our recalculation of the area using the same file showed a total area of 444.8 ha (see Figure 1). Note that part (e) in the KPI document stated the project area as 485.8 ha and this value does not recoincile with the total area of the leased area.

b) The project area map (*ProjectArea2020.shp*) had a total area of 472.1 ha which exceeds the total area leased for the project implementation (see Figure 2). Since the project is being implemented in the leased area and validated during the project design and the initial certification in 2015, the project area must not change or fall outside the geographic boundary of the leased area in this verification.

c) The geospatial dataset *EligiblePlantingArea2020.shp* presented the geographic boundary of the eligible planting area which meets the applicability conditions for implementing the project activity with a total area of 428 ha. The auditor recalculated the area to 425.63 ha (see Figure 3). We noted that the eligible planting area was estimated as 336.7 ha in the initial certification and 384.6 ha in the KPI document submitted for this verification.

d) The geospatial dataset *PlantingArea2020.shp* showed the geographic boundary of the planting area with a total area of 385.06 ha. The overlay of the planting area, eligible planting area and the lease area shows the boundary of the planting area in the north part exceeded the boundary of the lease area (see Figure 2).

e) The geospatial dataset for eligible planting area (*EligiblePlantingArea2020.shp*) showed some areas where the project activity could not be implemented. Although the geospatial dataset *Infrastructure2020.shp* was included in the audit pack, this file did not show the area, but rather (poly)lines, hence, did not match the areas excluded in the eligible planting area map (Figure 4). We also noted that the eligible planting area had more area excluded where the project activity could not be implemented.

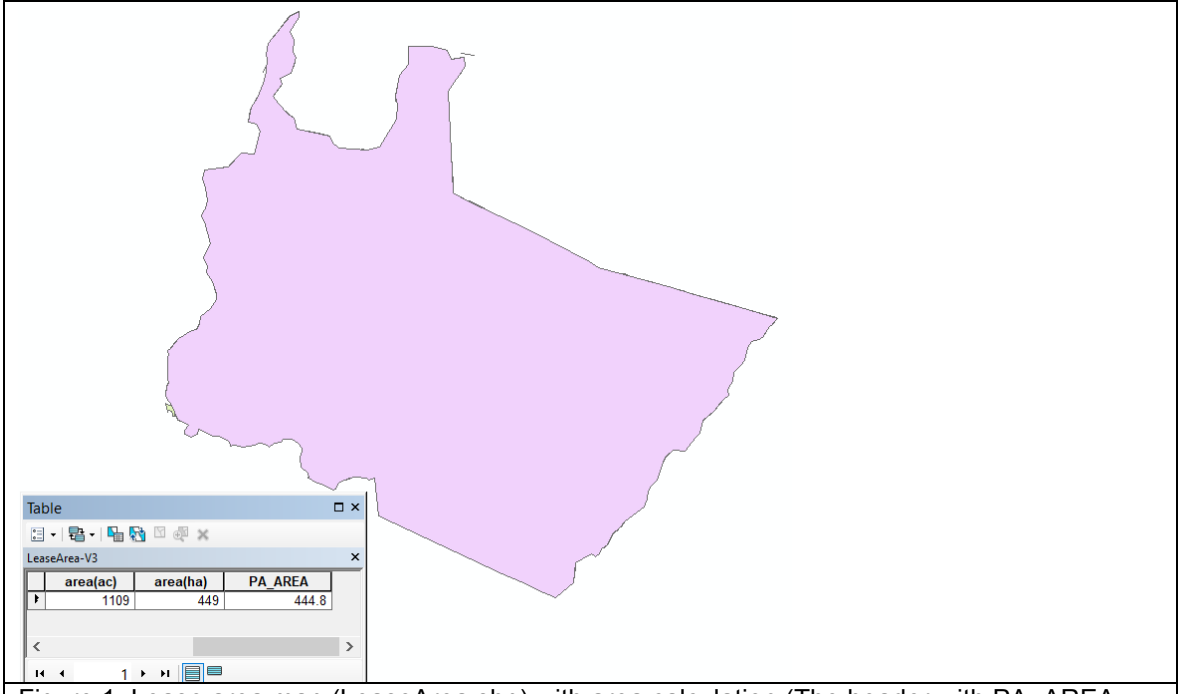


Figure 1: Lease area map (LeaseArea.shp) with area calculation (The header with PA_AREA was the area recalculated by the auditor in ArcGIS 10.2)

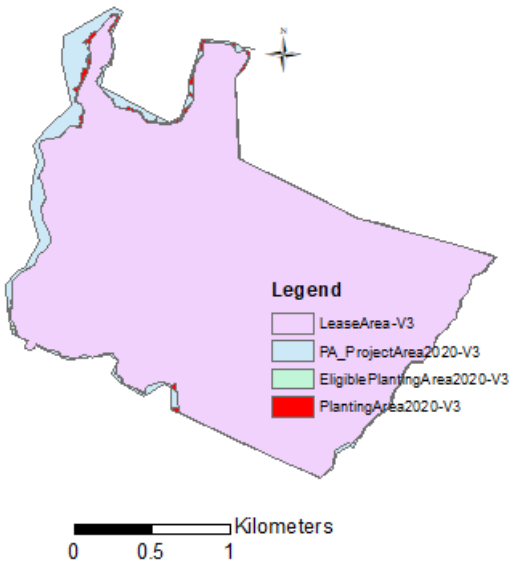


Figure 2: An overaly of Lease Area, Project Area, Eligible Planting Area and Planting Area

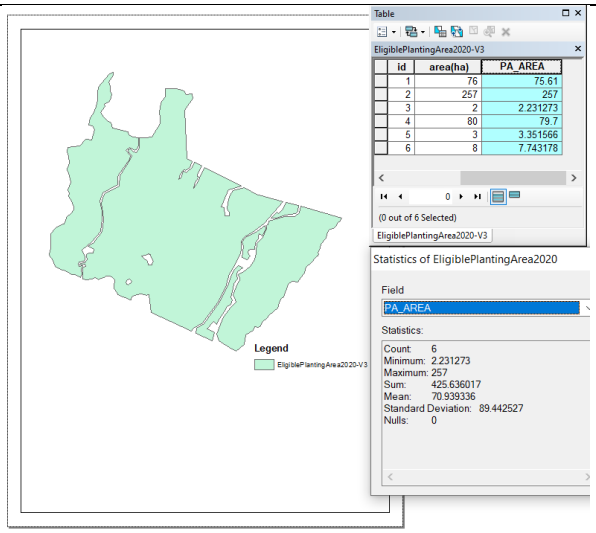


Figure 3: Eligible Planting Area map (EligiblePlantingArea2020.shp) with area calculation (The header with PA_AREA was the area recalculated by the auditor in ArcGIS 10.2)

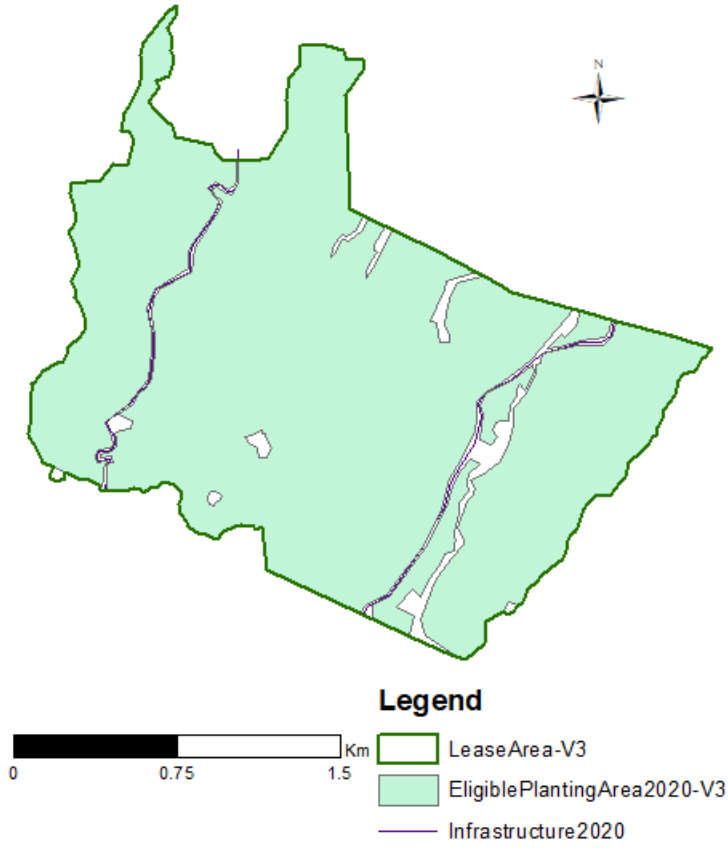


Figure 4: An overlay of Lease Area, Eligible Planting Area and Infrastructure map

Suggested action required:

(f) Please confirm that the geographic boundary of the areas leased for this project which was validated at the project design and verified at initial certification has not changed.

(g) Please confirm that the project area is located within the lease area and has not changed since the initial certification in 2015.

(h) The eligible planting area which meets the applicability conditions shall not change after the project design validation and initial verification. Please clarify why the eligible planting area is being changed in the KPI document in the initial certification (i.e. 336.7 ha) and the KPI document in this verification (384.6 ha) and in the geospatial dataset, *EligiblePlantingArea2020.shp* (425.63 ha).

(i) Please confirm that the planting area is located within the lease area and has not changed since the initial certification in 2015.

(j) Please update the geospatial dataset for infrastructure matching to the areas shown in the *EligiblePlantingArea2020.shp*.

Project Owner's response:

(a) The lease area boundary encloses 1109.1 acres, as stated in Clause 3a and shown in Exhibit A of *Second lease amendment 2013.pdf* (within the *2020 Audit_CAR responses* folder). The statement of 1200 acres project area in *GS3260_2.1_Key Project Information_Revised Apr 15.pdf* was erroneously carried over from documentation prepared by a previous consultant and not verified by the PO or auditor in 2015.

The shapefile *LeaseArea_SEPT2020.shp* with supporting files has been carefully digitised to reflect the positions of boundaries shown in Exhibit A of *Second lease*

amendment 2013.pdf and to provide a polygon area of exactly 1109.1 acres (448.8 ha).

Project activities have not been conducted outside this area, and the lease area has not changed in the field even though its extent has been variously reported in the historical documentation.

(b) The shapefile *ProjectArea_SEPT2020.shp* with supporting files exactly matches the shapefile *LeaseArea_SEPT2020.shp*. Project activities have not been conducted outside this area, and the Project Area has not changed in the field even though its extent has been variously reported in the historical documentation.

(c) The present calculation of Eligible Planting Area is 395.2 ha, and this is considered the best estimate. It has been derived from shapefile *EligiblePlantingArea_SEPT2020.shp* and is reported in Item (e) of *GS3260_2.1_Key Project Information_SEPT2020.pdf*.

The present calculation of Eligible Planting Area excludes only remnant or pre-existing vegetation (shown in *RemVeg_SEPT2020.shp*), road infrastructure (shown as polygon areas in *Infrastructure_SEPT2020.shp*), and small areas reserved from planting as potential future building sites (shown in *FutureBuilding_SEPT2020.shp*) from the Project Area. Great effort was taken to digitise these excluded layers precisely, including the mapping of each individual pre-existing koa tree.

Previous estimates of Eligible Planting area suffered from:

- Poorly georeferenced imagery that was used for digitising,
- Less precise mapping of remnant vegetation and road and building infrastructure, and
- An error in spreadsheet *MU Summary_Project* of *GS3260_5.7.2_Growth model and CO2-Fixation workbook_Revised Feb15.xlsx*, where cell C19 contained a formula '=sum(C12:C17)' when it should have been '=sum(C12:C18)'. This error excluded 42.6 ha from the projected future Timber plantings and also the estimate of Eligible Planting Area.

(d) The planting area of 366.6 ha (see Cell C28 in sheet *MU Summary_Project* of *GS3260_5.7.10_CO2-Fixation workbook_SEPT2020.xlsx*) is shown in shapefile *PlantingArea_SEPT2020.shp*. It is calculated by adding the MU areas of all planted and proposed future modelling units. 28.4 ha of small polygon areas are intended to remain unplanted due to the inefficiency of filling them in. These are mapped in *smallAreas_SEPT2020.shp*. Note that this shapefile layer is not exactly precise as it is used primarily for HLH internal planning purposes and there are roughly 0.2 ha of very small polygons included in Eligible Planting Area but not in Planting Area or Small Area shapefile layers.

(e) Road infrastructure is now mapped as polygon areas in *Infrastructure_SEPT2020.shp*

Additional documents provided by the Project Owner:
GS3260_2.1_Key Project Information_SEPT2020.pdf *Second lease amendment 2013.pdf* *LeaseArea_SEPT2020.shp* and associated mapping files *ProjectArea_SEPT2020.shp* and associated mapping files *EligiblePlantingArea_SEPT2020.shp* and associated mapping files *RemVeg_SEPT2020.shp* and associated mapping files *Infrastructure_SEPT2020.shp* and associated mapping files *FutureBuilding_SEPT2020.shp* and associated mapping files *PlantingArea_SEPT2020.shp* and associated mapping files

smallAreas_SEPT2020.shp and associated mapping files *GS3260_5.7.10_CO2-Fixation workbook_SEPT2020.xlsx*
Auditor's review of the PO's response:
a) The PO acknowledged the mistake in the project area previously reported and the issue was not picked up in the validation and verification of the project in 2015. To resolve the issue, the PO supplied a scanned copy of the document 'Second Amendment of Lease' signed on 11th Feb 2013 by the Lesser (Kukaiau Ranch LLC) and the Lessee (Hawaiian Legacy Hardwoods LLC). The lease document had explicitly stated the total lease area of 1109.1 Acres (equivalent to 448.8 ha) and also included maps. The PO digitized the maps in the lease document and generated a lease area map. The Auditor checked the lease map produced by the PO and confirmed the area of 1109 ha. Hence, the issue of the project area and the project boundary have been resolved. b) The PO presented the project area matching the geographical boundary to the lease area map. The project area has now changed to 1109 ha from 1200 ha reported in the initial certification 2015, however, the area was not substantiated by evidence. c) The PO established the eligible planting area of 395.2 ha out of the project area of 448.8 ha after excluding the existing remnant trees, roads and future building sites. The Auditor confirmed that the eligible planting area is completely located within the project area or lease area. Since the project area has been already validated and had initial certification in 2015, the change in the eligible planting area was a mistake carried over due to lack of accurate mapping at the previous validation. d) The planting area map PlantingArea_SEPT2020.shp was imported into the GIS platform and the total area was recalculated. This was confirmed to be 366.6 ha as estimated by the PO. e) The PO also submitted a geospatial file 'SmallAreas_SEPT2020.shp' for small areas scattered within the eligible planting area with a total area of 28.38 ha. However, these areas are not included in the planting areas. f) The PO delineated the infrastructure (i.e road network) in the project area with polygon features in the geospatial dataset 'Infrastructure_SEPT2020.shp'. The dataset was imported to the GIS platform and recalculated. The road network has a total area of 13.03 ha in the project area.

Conclusion	The CAR 16/20 is CLOSED.

CAR #:	CAR 17/20
Occurrence in the Document(s)	*GS3260_SatelliteImage_OCT2019_V3.tif*
Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements
Description of an issue to be addressed:	
We acknowledge the receipt of high resolution imageries (*GS3260_SatelliteImage_OCT2019_V3.tif* and *2004_HLH_ProjectArea_V2.tif*). However, these datasets are lacking spatial reference and could not be displayed together with other geospatial datasets of the project.	

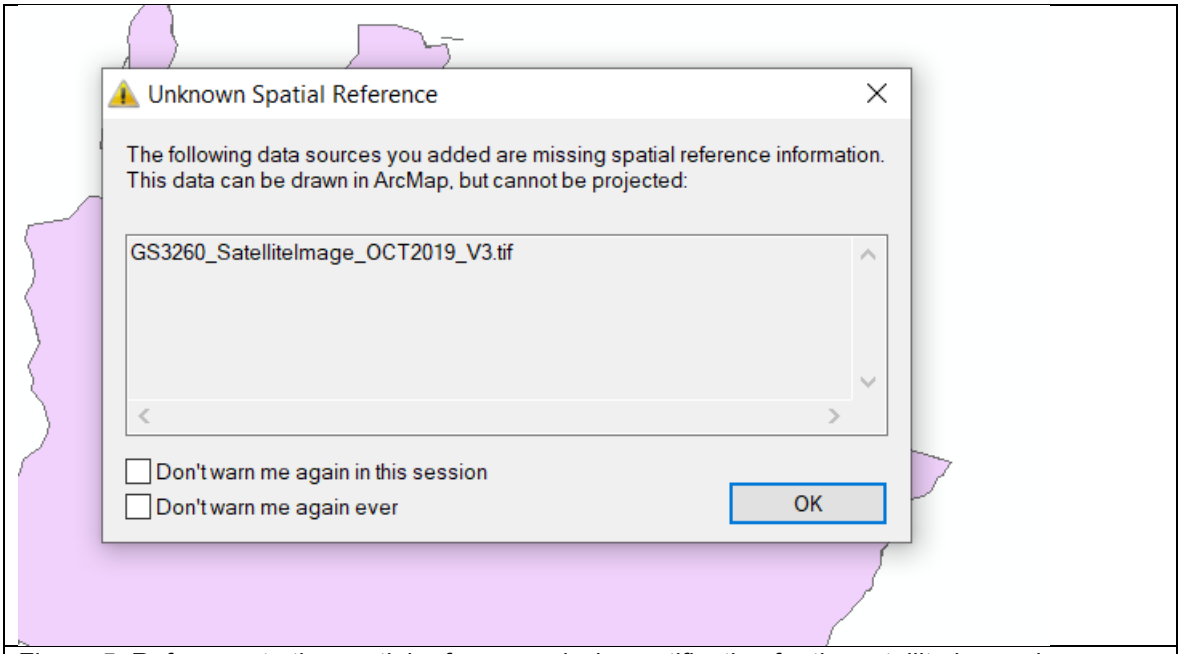


Figure 5: Reference to the spatial reference missing notification for the satellite imageries submitted

Suggested action required:

a) The PO is requested to project these imageries with the same spatial reference and projection as the other geospatial datasets of the project so that the imageries can be overlayed with the project maps.
b) Please provide the sources of these imageries and the date they were taken.

Project owner's response:

(a) *GS3260_SatelliteImage_OCT2019_V3.tif* has been exported from QGIS in GeoTIFF format*: GS3260_satellite2019_georef_11Sept.tif*

2004_HLH_ProjectArea_V2.tif has been exported from QGIS in GeoTIFF format*: GS3260_satellite2004_georef.tif*. Both files can be found in the *2020 Audit_CAR responses* folder.

(b) The 2004 image was captured on 21 Feb 2004 and was copied from Google Earth.

The 2019 image was captured in October 2019 and purchased from DigitalGlobe (https://www.digitalglobe.com/products/satellite-imagery)

Additional documents provided by the Project owner:

GS3260_satellite2019_georef_11Sept.tif

GS3260_satellite2004_georef.tif.

Auditor's review of the PO's response:

The PO provided the imagery with geographic references and these imageries can be overlaid with other project maps.

Conclusion	The CAR 17/20 is CLOSED.

CAR #:	CAR 18/20
Occurrence in the Document(s)	
Reference:	GS A/R v0.9; Chapter 2. Key Project Information Requirements

Description of an issue to be addressed:

We noted that the PO used high resolution satellite imagery to delineate the areas occupied by the existing trees (i.e. non-project trees). The areas under the existing trees are non-eligible planting areas and shall not be accounted in the Modelling Unit.

Suggested action required:

The PO is requested to provide:

a) the shape file for the area delineated for the existing trees in the project area
b) Update the planting area, eligible planting area and Modelling Unit maps to demonstrate that the areas under the existing trees are not accounted.

Project Owner's response:

(a) The shapefile for pre-existing trees in the project area is: *RemVeg_SEPT2020.shp* and associated mapping files.

(b) MU shapefiles have been updated to exclude all pre-existing trees (see list below)

Additional documents provided by the Project Owner:

RemVeg_SEPT2020.shp and associated mapping files
10-L_SEPT2020.shp and associated mapping files
10-T_SEPT2020.shp and associated mapping files
11-L_SEPT2020.shp and associated mapping files
11-T_SEPT2020.shp and associated mapping files
12-L_SEPT2020.shp and associated mapping files
12-T_SEPT2020.shp and associated mapping files
13-L_SEPT2020.shp and associated mapping files
13-T_SEPT2020.shp and associated mapping files
14-L_SEPT2020.shp and associated mapping files
14-T_SEPT2020.shp and associated mapping files
15-L_SEPT2020.shp and associated mapping files
15-Ldense_SEPT2020.shp and associated mapping files
15-T_SEPT2020.shp and associated mapping files
16-L_SEPT2020.shp and associated mapping files
16-T_SEPT2020.shp and associated mapping files
17-T_SEPT2020.shp and associated mapping files
18-L_SEPT2020.shp and associated mapping files
18-T_SEPT2020.shp and associated mapping files

Auditor's review of the PO's response:

The PO submitted individual boundary maps for each MU including the MUs already planted and the future planting MUs. The planted MUs boundary was copied to a single geospatial file 'PA_PlantingAreaAll.shp' in the GIS platform. The total area of the planted MUs was estimated to be 268.27 ha which was same as the planted MUs areas estimated by the PO. Further, the future planting MUs were copied and added to the geospatial file 'PA_PlantingAreaAll.shp' and the areas were recalculated to be 366.6 ha. This geospatial file matched the planting area of the project with the same total planting area of 366.6ha.

Conclusion	The CAR 18/20 is CLOSED.

CAR #:	CAR 19/20
Occurrence in the Document(s)	*GS3260_2.1_Key Project Information_SEPT2020.pdf; GS3260_5.7_CO2-Fixation_Revised SEPT2020.pdf GS3260_5.5_Baseline_SEPT2020.pdf*
Reference:	
Description of an issue to be addressed:	
The PO acknowledged the typological error and updated the document GS3260_5.5_Baseline_SEPT2020.pdf. c) We understand that the PO had undertaken new planting activity in the eligible planting areas within the existing project area after the initial certification in 2015. These planting areas were divided into eight homogenous areas and assigned to distinct Modelling Units. Since the planting activities occurred in the validated elibible planting area within the project area, no new areas have been added to the project after its initial certification. Therefore, 'New Area Certification' is not required for this project. d) On page 2 of the GS3260_5.5_Baseline_SEPT2020.pdf the eligible planting area is 268.4 ha which is not accurate.	
Suggested action required:	
a) The PO is requested to update all the template documents where 'New Area Certification' was 'checked' as the type of certification and avoid using 'new area certification' in the text. b) Please update the eligible planting area for the project with its correct value.	
Project Owner's response:	
a) All templates have been updated to remove references to 'new area' and to uncheck 'New Area Certification' if it was checked. b) Templated unchanged. The prompt 'eligible planting area' on page 2 of the GS Baseline Template is misleading – I interpret the document's intention t to capture the baseline of the areas certified so the area statistic must be certified area not project eligible planting area.	
Additional documents provided by the Project Owner:	
No new documents provided	
Auditor's review of the PO's response:	
a) The PO agreed to remove references to 'new area' and to uncheck 'New Area Certification'. b) The Auditor agrees with the PO that the term 'eligible planting area' is misleading. Hence, the previous value was correct. No requirement to change the value.	
Conclusion	The CAR 19/20 is CLOSED.

CAR #:	CAR 20/20
Occurrence in the Document(s)	*GS3260_5.7.9_HLH_InventoryResultsGrowthModel_2020_RevisedSEP2020.xlsx.*
Reference:	CAR 08/20
Description of an issue to be addressed:	

The response to CAR 08/20 states that plot 13-L was located in MU 13-L but has been excluded.
Suggested action required:
Please explain why plot 13-L was not included and how this decision impacted on the carbon fixation of the MU.
Project Owner's response:
Carbon fixation of MU 13-L was not calculated this year, so the MU is not eligible for VERs.
Additional documents provided by the Project Owner:
None
Auditor's review of the PO's response:
The Auditor checked the 'GS3260_0_HLH Project CO2 credits by year_SEPT2020.xlsx' and confirmed that the MU 13-L was not included in the carbon fixation calculation in this verification.

Conclusion	The CAR 20/20 is CLOSED.

CAR #:	CAR 21/20
Occurrence in the Document(s)	
Reference:	

Description of an issue to be addressed:
The PO provided 'Forest Inventory Procedures 2019-20' as a guideline for forest inventory - 2019. The data collection instructions suggest locating the plot centre for the measurement of 2019 sample plots via GPS coordinates, whereas it recommends identifying the plot centre marked in the field in the case of the sample plots measured in 2014. We understand that the geographic coordinates for the plot centres were provided to the inventory team for the sample plot inventory in 2019. The guideline does not provide details of how the sample plot locations and the intensity of the sample plot in each Modelling Unit were determined. We also note that the guidelines did not include instructions on slope correction and tree measurements in cases where the sample plots are located on a slope.
Suggested action required:
a) The PO is requested to explain the method used to select the geographic coordinates and the intensity of the sample plots in each Modelling Unit. b) The PO is requested to explain the approach the inventory team used to establish sample plots on a slope and for tree measurements.
Project Owner's response:
a) The procedure used to locate new plots was an adaptation of the grid method, where a regular grid is placed over the planted area and plots located on each intersection. In this case, adaptation was necessary due to the highly irregular nature of the MU polygons. Google Earth was used with a satellite image from before planting to avoid bias. MU polygons created in 2015 were visualised over the satellite imagery. Lines of common latitude were placed across the planting area at 3-second intervals. Plot positions were located along these lines within MU polygons when parts of the MU intersected with the East-West lines. The number of plots on each East-West line was determined by the consultant intuitively and depended on the number of lines that intersected with that MU

and the relative proportion of the MU crossing the particular East-West line. The intensity of sample plots was intended to provide for approximately 20% SE/mean, given a priori estimates of between-plot variance. If the precision of an MU's carbon fixation estimate was slightly higher than 20% after the first round of sampling, a decision was made whether to increase the sample intensity or proceed with a discounted eliglbe carbon fixation value. b) The inventory team did not adjust plot size for slope. Thus there is a small degree of conservativeness in the carbon fixation estimates because slope adjustment would create a larger plot area. The position of DBH is always ascertained from the up-slope side of the tree. This was communicated to the team, even if it is not documented in the instructions.
Additional documents provided by the Project Owner:
None
Auditor's review of the PO's response:
Further to the above explanation, the PO provided a screenshot of the grid overlay on the MUs for determining the sample plot location. The sample plots were distributed across the MUs.

Conclusion	The CAR 21/20 is CLOSED.

CAR #:	CAR 22/20
Occurrence in the Document(s)	
Reference:	

Description of an issue to be addressed:
We acknowledge that the PO provided the modelling of carbon performance by the project activity and the carbon fixation summary for the Modelling Units on a per hectare basis. However, the PO has not provided the calculation of the ex-post carbon fixation in this verification.
Suggested action required:
The PO is requested to provide the ex-post carbon fixation in this verification.
Project Owner's response:
The value for ex-post carbon fixation for this verification is 7837 t. This value is derived from the difference between the ex-post carbon fixation registered at the initial certification (174 t) and the total ex-post carbon fixation at this verification (8011 t). See GS3260_0_HLH Project CO2 credits by year_SEPT2020.xlsx/ AnnualCO2Fix_IssuanceControl cell FC57 and preceeding calculations, which are described on the WORKBOOK EXPLANATION tab of the same workbook and in the response to CAR 23/20 below.
Additional documents provided by the Project Owner:
GS3260_0_HLH Project CO2 credits by year_SEPT2020.xlsx.
Auditor's review of the PO's response:
The estimation of the carbon fixation in the verification was checked in the excel file provided and the Auditors did not find any issue in the calculation of carbon fixation for eight MUs claimed

in this verification.	
Conclusion	The CAR 22/20 is CLOSED.

CAR #:	CAR 23/20
Occurrence in the Document(s)	*GS3260_6.1_Carbon Performance.pdf*
Reference:	*AR-requirements_v0-9.pdf (6. Carbon Performance requirements)*
Description of an issue to be addressed:	
The PO estimates the ex-ante carbon fixation as 266,151 tCO2 from the project over the 50 year crediting period. According to the Carbon Performance requirements, the PO is required to demonstrate that the validated/verified carbon stock is aligned with the expected carbon stock. The Carbon Performance template document submitted to the auditor states that the project does not have any carbon shortfalls.	
Suggested action required:	
The PO is requested to justify the statement by demonstrating that the ex-post carbon fixation in this verification period is aligned with the projected carbon stock.	
Project Owner's response:	
The question 'Is the validated/verified carbon stock aligned with the expected carbon stock?' simplifies to 'Is the verified carbon stock aligned with the expected carbon stock in verified modelling units to date?' because the validated component of carbon stock is exactly the expected carbon stock for those modelling units that have not been verified and for the future portion of the modelling units that have been verified. This question is answered in the affirmative in the workbook GS3260_0_HLH Project CO2 credits by year_SEPT2020.xlsx. Examination of the graph presented in columns FH:FR of tab AnnualCO2Fix_IssuanceControl will show that the verified carbon stocks in the eight modelling units that have been submitted for verification (10-L, 11-L, 12-L, 10-T, 11-T, 12-T, 13-T, and 14-T) is very similar to the expected (modelled) carbon stocks from 2010 to 2017, and is tracking higher from 2017 to 2019. Note that two tabs have been added to the workbook GS3260_5.7.9_HLH_InventoryResultsGrowthModel_2020_RevisedSEP2020.xlsx in order to facilitate this comparison: exPostLegacyMU-interpolation and exPostTimberMU-interpolation. The interpolations calculated for legacy carbon fixation are non-material because the carbon fixation is considered in the permanent pool so the total amounts registered at the 2019-20 inventory are the important statistics. However, for the timber unit interpolations, effort was made to create biologically meaningful growth curves (see GS3260_5.7.9_HLH_InventoryResultsGrowthModel_2020_RevisedSEP2020.xlsx/ exPostTimberMU-interpolation) because 1/50 of each annual value of carbon stock contributes to the sum of carbon in the rotational pool.	
Additional documents provided by the Project Owner:	
GS3260_0_HLH Project CO2 credits by year_SEPT2020.xlsx.	
Auditor's review of the PO's response:	
The PO presented a comparison of the ex-ante and ex-post carbon fixation for the MUs in this reporting period. The Auditors checked the calculation and confirmed that the Project has no performance shortfall in this verification period.	
Conclusion	The CAR 23/20 is CLOSED.

4.2 Assessment of FARs from previous verification (24 March 2015):

FAR #:	FAR 01/15
Occurrence in the Document(s):	*Gold Standard A/R Requirements V0.9 Workers Conditions*
Reference:	Workers Conditions
Description of an issue to be addressed:	
The auditor observed that the workers of HLH provide essential technical and practical knowledge, without which the project would suffer greatly. Given the dissatisfaction expressed by some workers this forward action request is issued such that future auditors should confirm whether workers feel their compensation and worker agreements have improved. Due to the specialized nature of some of the jobs fulfilled by workers, loss of some workers could threaten project success.	
Suggested action required:	
Please provide evidence to demonstrate that the above issue has been resolved.	
Project Owner's response:	
Compensation and worker agreements have improved since the time of the initial certification audit. This is justified by the responses given by workers in the February 2020 survey (see: /Dropbox/GS 2020 Certification Documents/3.5 Sustainability Monitoring Plan : Annual Reports/GS3260_3.5.1_Employee interview records.xlsx): • On a 1-5(best) scale, three workers rated their 'salary and benefits' as score 5, four as score 4, two as score 3, and only one as score 1. • On a 1-5(best) scale, all employees rated their 'working conditions overall' as a score 4 or score 5.	
Additional documents provided by the Project Owner:	
No additional documents provided	
Auditor's review of the PO's response:	
The PO provided the worker's survey conducted in Feb 2020 in the document *GS3260_3.5.1_Employee interview records.xlsx*. The interview questionnaire included the questions on job satisfaction, organization, supervisor and overall working conditions. Only one worker rated poor to salary and benefits while the remaining six out of seven workers said above average. Three of the workers expressed excellent pay and benefits. Regarding the overall work satisfaction, four workers rated it excellent and the remaining three rated '4'. They appear to be pleased with the supervisor, and most of them said 'excellent' to all questions regarding supervisor roles and working relationships. While interviewing three workers, the Auditor reiterated the questions about the working conditions, salary and satisfaction, all three responded very positively about improvement in the working conditions, salary and benefits and were happy with the supervisor.	
Conclusion	The FAR 01/15 is closed.

FAR #:	FAR 02/15
Occurrence in the Document(s):	*Gold Standard A/R Requirements V0.9 Sustainability Monitoring Plan*

Reference:	Sustainability Monitoring Plan
Description of an issue to be addressed:	
Some of the parameters selected for monitoring are notoriously difficult to measure. Meaningful monitoring implies having clearly identified parameters for measurement such that future monitoring events can make quantitative comparisons between parameter values at the monitoring event and at the inception of monitoring (which is not defined). This includes "Biodiversity Improvement". The developer justifies the assertion that the baseline represents "very poor biodiversity" based on the endangered species survey conducted in 2012. While the auditor agrees on this general observation there is no monitoring plan provided at this point that could meaningfully detect an improvement from "very poor biodiversity" to some improved biodiversity state. It is asserted that "surveys of plant and animal species will be conducted, including attempts to record rare, threatened and endangered species". This generic description does not identify the fundamental components of biodiversity monitoring including, what shall be used as a proxy for improvement in biodiversity, how shall this be monitored, and when represents time 0 of monitoring? It may be that the developer intends to compare species prevalence data in future monitoring to the 2012 survey, but this is not made clear. Additionally, with no pre-identified proxies to represent biodiversity improvement monitoring will likely be inconstant and unsuccessful and provide muddled results.	
Suggested action required:	
Please provide evidence to demonstrate that the above issue has been resolved.	
Project Owner's response:	
A biodiversity monitoring plan has been formulated, which stipulates measurement of species richness in flora and birds to provide indicators of overall biodiversity improvement due to project activities. Measurement is to be conducted at least every ten years, with baseline (year 0) being 2010, when the reforestation commenced.	
Additional documents provided by the Project Owner:	
GS3260_3.1.17_BIODIVERSITY MONITORING PLAN.docx	
Auditor's review of the PO's response:	
Quantitative method, plan developed, monitoring scheduled every 10 years.	
Conclusion	The PO has prepared the biodiversity monitoring plan (GS3260_3.1.17_BIODIVERSITY MONITORING PLAN.docx) in response to FAR 02/2015 which stipulates a monitoring frequency of every 10 years after the commencement of the project in 2010. Hence, the biodiversity monitoring is due in 2020. Thus, FAR 01/20 is created which requires the PO to undertake biodiversity monitoring in 2020 as stipulated in the plan and submit the report to the auditor in the next verification.
	The FAR 02/15 is closed.

5. List of findings

5.1 Non-conformance assessment

Project Area, Eligible Planting Area and Modelling Unit		
Risk Area 1	The Project has changed the Project Area in the reporting period between 1st January 2015 to 28th Feb 2020.	
Audit Procedures and Findings	The following audit procedures were implemented to assess changes in the Project Area: 1) the Project documents and maps were reviewed; 2) high-resolution satellite imagery and Google Earth were qualitatively assessed for any disturbance or damage; and 3) HLH staff interviewed were asked for any disturbance and damage in the Project Area in the reporting period. The Auditor's review confirmed that the project documents and maps did not report any disturbance or damage in the Project Area. A qualitative assessment of the satellite imagery and Google Earth did not identify any disturbed or damaged patch within the Project Area. HLH staff also confirmed that no disturbance or damage had occurred in the Project Area except a one-off incident when a cow entered into the plantation area through a damaged fence. The cow was detained and immediately removed and the fence was fixed. While reviewing the geospatial files for the project area, we identified some discrepancy, which is discussed in Risk Area 2. The review of the project documents, GIS files, remote sensing imageries and the interview with the project staff concur that the project area has not changed since the last verification.	
Relevant CAR/FAR/OBS	NA	
Status of CAR/FAR/OBS	NA	
Conformance	Yes ☒	No ☐

Risk Area 2	A risk that the Project has not accurately mapped and estimated the Project Area, Planting Area, Eligible Planting Area and Infrastructure.
Audit Procedures and Findings	The following audit procedures were implemented to assess the mapping and estimation of the areas for the Lease Area, Project Area, Planting Area, Eligible Planting Area and Infrastructure: 1) The maps provided in the audit pack were imported into ArcGIS 10.2 and overlaid with the Lease Area map to see that Project Area, Planting Area, Eligible Planting Area and Infrastructures are entirely located within the Project Area; 2) Planting Area and Eligible Planting Area maps were overlaid to see that Eligible Planting Area is within the Planting Area; 3) Check the Project Area, Planting Area, Eligible Planting Area and Infrastructures area were appropriately mapped and complete; 4) Re-estimate the areas for the Lease Area, Project Area, Planting Area, Eligible Planting Area and Infrastructure. The spatial analysis in the ArcGIS 10.2 identified the following discrepancies and inconsistency between the maps and the documents submitted by the PO: 1) the boundary of the eligible planting area map

(EligiblePlantingArea2020.shp) extended outside the Project Area (ProjectArea2020.shp) (CAR 10/20). 2) The boundary of the planting area (PlantingArea2020.shp) occurred outside the eligible planting area (EligiblePlantingArea2020.shp) (CAR 11/20). 3) The area derived from the Lease Area map (LeaseArea.shp) does not reconcile with the total area stated in the KPI document (CAR 16/20). 4) The Project Area map (ProjectArea2020.shp) had a total area of 472.1 ha which exceeds the total area leased for the project implementation (CAR 16/20). 5) The Eligible Planting Area was estimated as 336.7 ha in the initial certification and 384.6 ha in the KPI document submitted in this verification (CAR 16/20). 6) The boundary of the Planting Area (PlantingArea2020.shp) in the north part exceeded the boundary of the Lease Area CAR 16/20). 7) The geospatial dataset Infrastructure2020.shp was included in the audit pack, this file did not show the area, but rather (poly)lines.

We doubt that these maps were properly assessed in the initial certification. If they were, there would not have been any of the above issues.

In response to the CARs 10/20, 11/20 and 16/20 issued on the mapping, the PO dedicated the time and resources to create accurate maps. At the fourth iteration, the PO provided sets of maps relevant to the project. These maps were assessed in ArcGIS 10.2 and confirm the following: 1) The Lease Area map has a total area of 1109 acre (448.8 ha) and the boundary appears to match the Lease Area map presented in the lease agreement. 2) The revised Project Area map (ProjectArea_SEPT2020.shp) has the exact same boundary as the Lease Area where the PO has carbon right and authority to implement the A/R activities. 3) The Eligible Planting Area (EPA) map (EligiblePlantingArea_SEPT2020.shp) is confirmed to be located within the Project Area boundary with a total area of 395.2 Ha. The EPA boundary excludes the infrastructure, remnant vegetation, non-planting area and future planting areas. Note that the previous EPA map did not exclude the remnant vegetation despite the fact that A/R activity could not be implemented in those areas. 3) The updated Planting Area map (PlantingArea_SEPT2020.shp) has a clear boundary within the Eligible Planting Area with a total area of 366.6 ha. 4) The Infrastructure map represents the road network with polygons whereas previously the road network was represented by polylines without the area. The total area of the road network was recalculated to 13.0 ha. 5) The Remnant Vegetation was mapped out in RemVeg_SEPT2020.shp with a total area of 38.4 ha. 6) The small areas with a total area of 28.4 ha were delineated excluded from the eligible planting area where A/R activity was not implemented or forest did not grow after A/R activity. 7) The PO has set aside 1.7 ha area for a Future Building site. The final boundary maps and their areas are summarized below:

Table 1: A summary of the final maps provided by the Project Owner

Mapping area	Geospatial file name (.shp)	Area (ha)
Lease Area	LeaseArea_SEPT2020	448.8
Project Area	ProjectArea_SEPT2020	448.8
Eligible Planting area	EligiblePlantingArea_SEPT2020	395.2
Planting Area	PlantingArea_SEPT2020	366.6
Road Network	Infrastructure_SEPT2020	13.0
Remnant trees	RemVeg_SEPT2020	38.4
Non-planting area	SmallAreas_SEPT2020	28.4
Future building site	FutureBuilding_SEPT2020	1.7

Thus, the Project Owner had accurately mapped boundaries of the Project

	Area, Eligible Planting Area, Planting Area, Infrastructure, Remnant Vegetation, Non-planting Area and Future Building side and provided separate geospatial files (i.e. shapefiles) as per the section 2.1.2 Key Project Information Requirements in A/R Methodology V0.9 (Road Test).	
Relevant CAR/FAR/OBS	CAR 10/20; CAR 11/20, CAR 16/20	
Status of CAR/FAR/OBS	CAR 10/20; CAR 11/20 and CAR 16/20 are closed.	
Conformance	Yes ☒	No ☐

Risk Area 3	The Project has not accurately identified the Modelling Unit (MU) in the Project Area based on the GS4GG requirements.
Audit Findings	The Project has identified altogether 24 Modelling Units (MUs) in the Project Area including the 14 MUs for Legacy model and 11 MUs for the Timber model. Out of the 14 MUs of the Legacy model, four MUs have been set-aside for future planting between 2021 and 2024 and the other ten MUs were planted between 2010 and 2018. While reviewing the individual MU map and the excel files, we identified inconsistency in the area estimation which could not be confirmed by recalculating the area of the MUs in ArcGIS 10.2. CAR 12/20 was issued to revisit the MUs area in the geospatial files after updated the geospatial files for the Project Area, Eligible Planting Area and Planting Area. The PO provided the updated maps for all MUs and a summary of the MUs area in PolygonArea_SEPT2020.xlsx. We noted that the MUs maps excluded the remnant vegetation and the small areas where A/R activity was not implemented or forest did not grow after A/R activity. These MUs maps were reviewed in ArcGIS 10.2 and the MUs planted between 2010 and 2018 were imported into a single map. The resulting map has 500 polygons with a total area of 268.4 ha matching to the total areas of 18 MUs in the excel file (PolygonArea_SEPT2020.xlsx). When the future MUs were added to the map, the total area of all the MUs (737 polygons) was estimated as 366.6 ha confirming to the total area presented in the PolygonArea_SEPT2020.xlsx. The Project has stratified the MUs based on the age cohort using the plantation year in two management regimes, i.e. Legacy and Timber model. The Project has stratified 220.9 ha as Legacy model and 145.8 ha as Timber model (Table 2). Table 2: A summary of the MUs final maps provided by the Project Owner

MU ID	Geospatial file name (.shp)	Area (ha)	MU ID	Geospatial file name (.shp)	Area (ha)
10-L	10-L-SEPT2020	4.71	10-T	10-T-SEPT2020	9.79
11-L	11-L-SEPT2020	9.79	11-T	11-T-SEPT2020	18.63
12-L	12-L-SEPT2020	46.12	12-T	12-T-SEPT2020	35.27
13-L	13-L-SEPT2020	35.68	13-T	13-T-SEPT2020	22.60
14-L	14-L-SEPT2020	11.97	14-T	14-T-SEPT2020	14.87
15-L	15-L-SEPT2020	13.19	15-T	15-T-SEPT2020	9.17
15-L Dense	15-L-SEPT2020	5.75	16-T	16-T-SEPT2020	5.15
16-L	16-L-SEPT2020	3.03	17-T	17-T-SEPT2020	13.34
18-L	18L-SEPT2020	5.60	18-T	18-T-SEPT2020	3.73
21-L	21-L-SEPT2020	5.04	21-T	21-T-SEPT2020	7.21
22-L	22-L-SEPT2020	22.36	22-T	22-T-SEPT2020	6.00
23-L	23-L-SEPT2020	36.13			
24-L	24-L-SEPT2020	21.53			
Legacy total area (ha)		220.9	Timber Total area (ha)		145.8
All Mus total area (ha)		366.6 ha			

	Thus, the Project Owner had accurately mapped boundaries of the Modelling Units and provided separate geospatial files (i.e. shapefiles) as per section 2.1.2 Key Project Information Requirements in A/R Methodology V0.9 (Road Test).	
Relevant CAR/FAR/OBS	CAR 12/20	
Status of CAR/FAR/OBS	CAR 12/20 is closed.	
Conformance	Yes ☒	No ☐

Risk Area 4	The Project has not extended the Eligible Project Area outside the Project Area.
Audit Findings	CAR 04/20 raised an issue regarding the change in the eligible planting area from 336.7 ha in the initial certification to 384.6 ha in this verification. The PO acknowledged this issue and clarified that the EPA mapping was not accurately done previously and the area quoted in the initial certification mistakenly did not include MU 16-T area of 42.6 ha. We received two EPA maps with different areas and ground representation. 2015EligiblePlantingArea.shp had 376.6 ha while another EMA map ((c) Eligible Planting Area.shp) had 420 ha. Following the update of the Lease Area and Project Area maps conforming to the lease area boundary as per the lease agreement, the PO prepared a new EPA map (EligiblePlantingArea_SEPT2020.shp) excluding the infrastructure, remnant vegetation, small areas and future building area. An analysis in ArcGIS 10.2 confirms that the EPA map excludes the non-eligible area of 53.1 ha (i.e. summation of infrastructure, remnant vegetation, small areas and future building area) from the Project Area of 448.8 ha and the area calculation gives the same result as the area of the EPA map (395.7 ha). Further we checked and confirmed by overlaying the maps that the EPA lies within the Project Area boundary (Figure 1) and MU 16-L, missed in the calculation, is located within the EPA. (Figure 2). Figure 1: Overlay of the EPA map on the Project Area map demonstrates the EAP area is entirely located within the Project Area boundary.

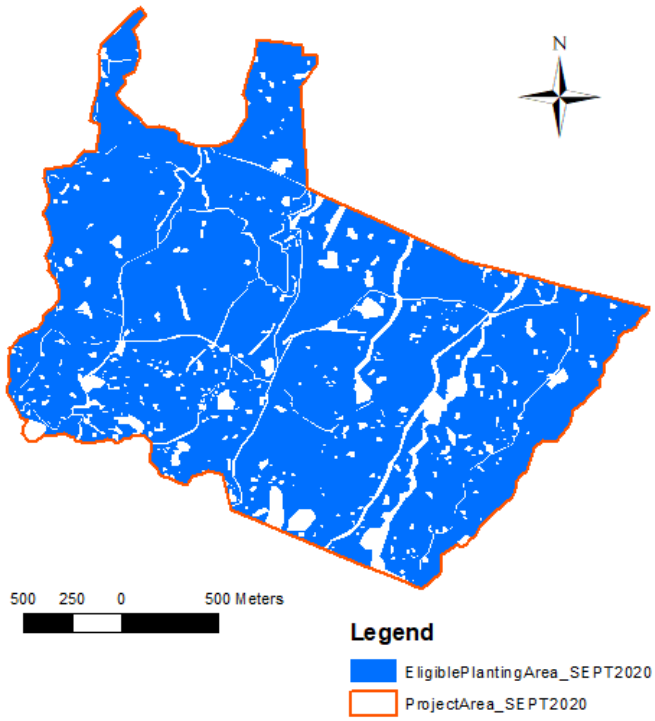
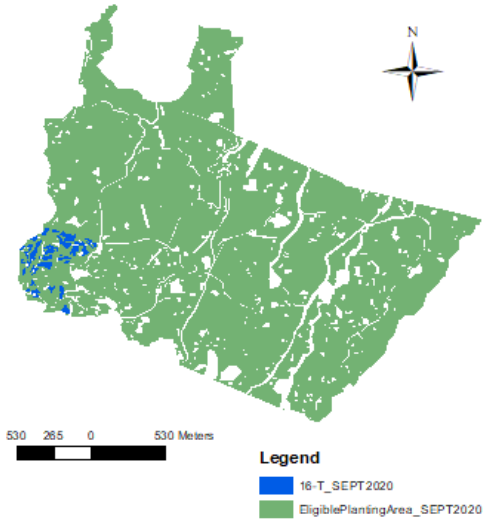


Figure 2: Overlay of MU 16-L on EPA map demonstrates the MU 16-L is entirely located within the Project Area boundary.



Since the updated EPA map is located within the Project Area, we believe that the EPA area should have been validated at the initial certification. However, the miscalculation and misrepresentation of the EPA area resulted in confusion and the erroneous EPA mapping.

Our analysis of the maps confirms that the EPA is not an area added to the Project Area after the initial certification and therefore, does not qualify as a New Area as per the GS definition of 'New Area'.

Thus, the Auditors confirm that the Project Owner had accurately mapped the boundary of the Eligible Planting Area (EligiblePlantingArea_SEPT2020.shp) this time as per section 2.1.2 Key Project Information Requirements in A/R Methodology V0.9 (Road Test)

	and the EPA boundary does not extend outside the Project Area validated in the initial certification.	
Relevant CAR/FAR/OBS	CAR 04/20	
Status of CAR/FAR/OBS	CAR 04/20 is closed.	
Conformance	Yes ☒	No ☐

CO2 Fixation

Risk Area 5	The Project did not accurately measure the trees and did not correctly identify tree species for accounting carbon credits.
Audit Findings	The field visit to the Project Area was not possible because of COVID 19. The Auditor had to cancel the flight scheduled on 24 March 2019. Therefore, the Auditor used an indirect method to ascertain that the tree measurements were undertaken accurately in the MUs. The spatial file for the sample plots was checked to see the distribution of plots across the MUs, the original field data book was checked, the SOP for the inventory was viewed and an interview was conducted with the leader of the inventory team. The geospatial datasets for the sample plots (2020Plots.shp) were imported into ArcGIS 10.2 geographic and overlaid on the MUs maps. The 240 sample plots are distributed across the MUs established between 2010 and 2014. The sample plot locations were determined within MUs by locating a sample plot at an intersection of a regular grid. The interview with the inventory lead confirmed that the HLH organized inventory training for two HLH staff. The training focused on using the equipment for locating sample plots using GPS and taking tree measurements in the sample plots of 7 m radius. The PO provided photographs of the equipment used for inventory including GPSMAP 66st for finding sample plot location, Original Loggers Tape and TRUPULSE 200L Rangefinder for height measurement. The measurements were recorded in a spiral notebook. The Auditor selected 12 sample plots, i.e. 5% of the total sample plots by using a random number generator and requested the PO to provide the original field book. The field data in the original field book were checked against the plot data in the tab AC_data_2019-20 in the excel of GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx. Except for missing height measurement data, the rest of the data in the excel file matched with the original data. The field measurements only involved Koa trees in the sample plots. The interview with the HLH staff confirmed that the inventory team was composed of experienced staff and had no issue with identifying the tree species. We understand that the PO used the grid method and adapted to the field situation due to the irregular boundary of the MUs as demonstrated by the screenshots of the grid lines over the MUs. Since the method was not clearly described in the Forest Inventory Instruction and subjective nature of the grid laying, the sample points may not be consistently located at the

	same place which may involve biases in the sample plot selection. It is appropriate to use a tool, which can produce a random location of sample plots that the Auditor or third party can use to replicate and check the sample plot selection by applying the same method. To improve the consistency and data quality control, the PO is requested to elaborate on the sample plot selection, sampling intensity determination, data quality control procedure, record keeping and use of standard inventory form in the Forest Inventory Instruction document.	
Relevant CAR/FAR/OBS	CAR 21/20	
Status of CAR/FAR/OBS	CAR 21/20 is closed. A FAR 02/20 is generated.	
Conformance	Yes ☒	No ☐

Risk Area 6	The Project has not implemented the activities related to plantation and their management.
Audit Findings	The Project commenced the A/R activities in 2010 and established plantations in 18 MUs with a total area of 268.4 ha by 2020. The Auditor assessed the A/R activity in the Project Area indirectly by viewing the photo evidence for nursery with seedlings, A/R activities and forest inventory. The PO also provided the seedling production records, invoices from the nursery operator, tree planting records, summary of the planting in new areas and employee interviews. The high-resolution satellite imagery (GS3260_satellite2019_georef_11Sept.tif) acquired on 24 November 2019 from DigitalGlobe and the cross-checking in the Google Earth by generating the kml file from the Project Area demonstrated the established plantation within the Project Area. (Figure 3 and 4). We observed the age cohorts of the plantations in different texture and colour on the imagery and Google Earth. The dense canopy with darker colour areas represents the older plantation whereas the young plantations are visible with trees in rows and light colour. The overlay of MUs maps on the high-resolution imagery identified the different age cohorts in the MUs represented by the year of the plantation (Figure 4). The MUs maps correspond to eight distinct patches of homogenous areas planted since the initial certification in 2015. Figure 3: High resolution imagery with the Project Area boundary.

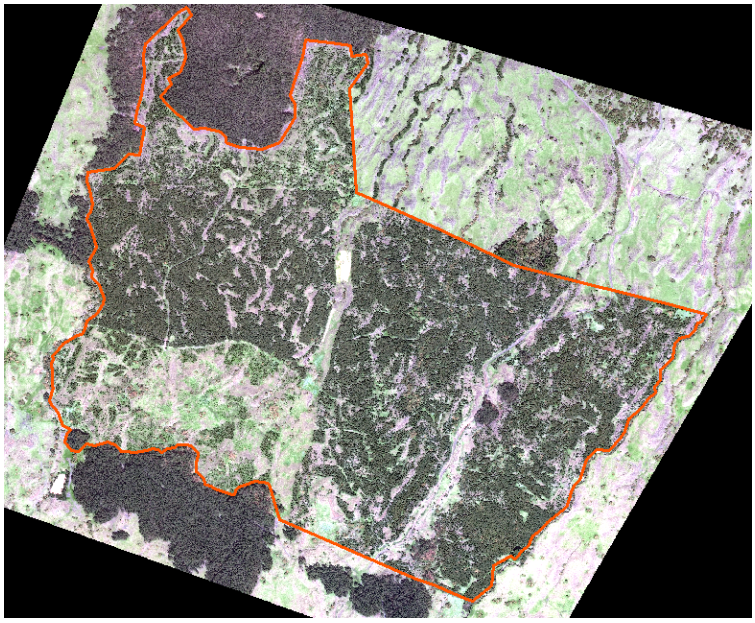
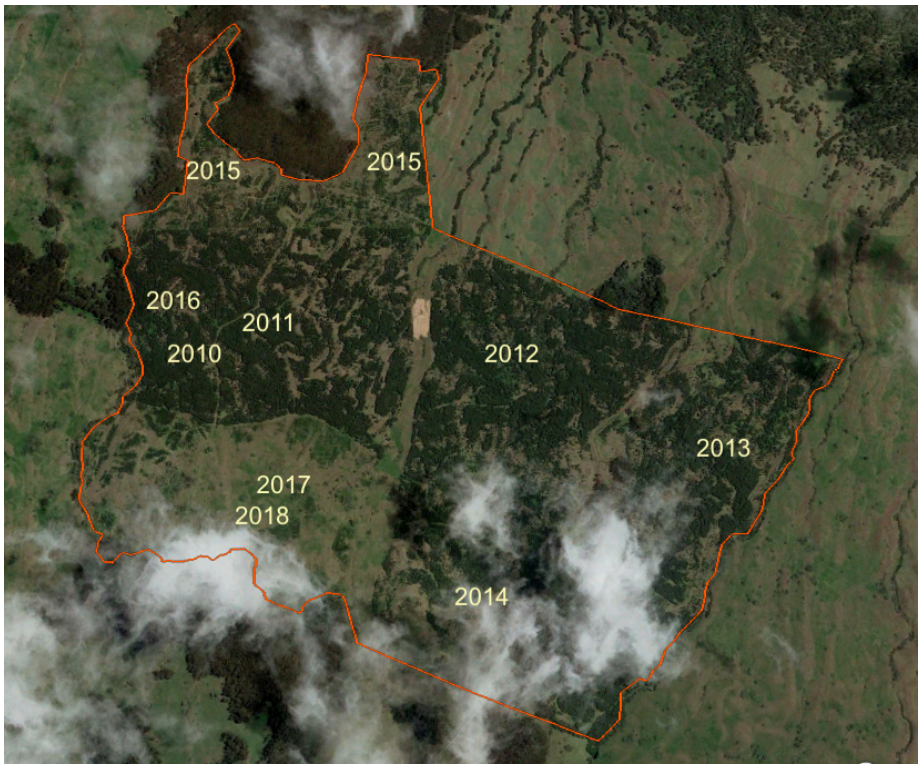


Figure 4: Google Earth with the Project Area boundary showing the plantation year on different MUs.



The evidence provided by the PO and the visualization of the MUs in the high-resolution imagery and Google Earth confirms that the PO has undertaken A/R activities in the Planting Area within the Project Area.

Relevant CAR/FAR/OBS	NA
Status of	NA

CAR/FAR/OBS		
Conformance	Yes ☒	No ☐

Risk Area 7	The Project Owner has not undertaken the sustainability monitoring as stipulated in the sustainability monitoring plan.	
Audit Findings	The PO has provided the updated sustainability monitoring plan (SMP) and annual monitoring reports for the period 2015 to 2019, which were submitted to Gold Standard. The annual report summarizes the project activities and monitoring of worker satisfaction, existing worker satisfaction, chemical pesticide use, chemical spillage, soil fertility testing, soil erosion evaluations, nursery production and employment status. The annual monitoring reports (2015 to 2017) mentioned the legal cases against the Project by a consulting firm regarding a payment dispute and by the landowner on the activities inside the Project Area. The Project won the case against the consulting firm and was awarded compensation by the court in 2018. The dispute between the landowner and the Project was resolved outside the court. The Project Staff confirmed the settlement of both legal cases and the news was published online on 12 March 2019 (https://www.prweb.com/releases/legacy_carbon_llc_and_five_other_parties_awarded_273_930_14_against_streamline_consulting_group_llc/prweb16161292.htm). The annual reports had acknowledged the above legal cases negatively impacted on the project operation between 2015-2018 financially and logistically requiring moving out of the accommodation provided by the landowner. The Chief Operating Officer mentioned that the project operation is getting back to normal as both legal cases were settled. The Project appears to monitor the chemical pesticide use and chemical spillage. However, the PO has not undertaken soil fertility testing and soil erosion evaluation annually because of accessibility issues outside the Project Area. The monitoring of the worker's satisfaction and their work conditions did not happen between 2015 and 2019. In the worker's interview in 2020, except for one worker not satisfied with the salary, the rest of the workers are happy with the salary, work conditions and relationship with the supervisor. We noted that the HLH is a certified B Corporation (https://bcorporation.net/certification), and has scored a high B impact Score (137.8 out of 200) based on its social and environmental performance (https://bcorporation.net/directory/hawaiian-legacy-hardwoods). The implementation of a Sustainability Monitoring Plan (SMP) is essential to ensure the monitoring of the identified parameters of mitigation measures for social, economic and environmental sustainability. It concerns us that the PO has not followed the SMP to monitor all the parameters as scheduled in the plan. Therefore, a FAR is raised requiring undertaking of biodiversity monitoring due in 2020 and soil condition to be monitored every five years to be addressed at the next verification	
Relevant CAR/FAR/OBS	FAR 02/15	
Status of CAR/FAR/OBS	FAR 02/15 is closed but FAR 01/20 is generated.	
Conformance	Yes ☒	No ☐

Risk Area 8	The PO has not had a Grievance and Input (G & I) Mechanism in place and has not addressed issues or concerns raised by the stakeholders.	
Audit Findings	The Project had adapted three different methods for Grievance and Input (G & I) as stated in the annual report. A Grievance and Input (G & I) book is kept at the Project's Office at Unit #13 Umikoa Village, Paauilo, HI 96776. The Project has a dedicated webpage (http://www.legacycarbon.com/stakeholder_feedback.html) for providing any G & I to the Project. The Auditor visited the webpage, and the page is found to be operational. Stakeholders can also access the page from the main website of the HLH (http://www.legacycarbon.com/index.html). The annual report also mentioned the telephone number where stakeholders can leave comments on any G & I issues. The annual reports did not report any G & I in the years 2015 – 2019 as the Project did not receive any concern from the stakeholders from any of the three methods. The Chief Operating Officer of the Project also confirmed that they have no issue with the stakeholders and had not received any G & I from them except the two legal cases, which were resolved in 2019. The Project has no G & I issues. Thus, the Project meets the GS requirement for Grievance and Input Mechanism.	
Relevant CAR/FAR/OBS	FAR 01/15	
Status of CAR/FAR/OBS	FAR 01/15 is closed.	
Conformance	Yes ☒	No ☐

Risk Area 9	The Project did not appropriately select the carbon pools, tree parameters, default or derived factors, rotation forestry and did not apply them accurately for estimating carbon fixation for the project.
Audit Findings	The Project had appropriately selected aboveground biomass and belowground biomass pools for accounting carbon sequestration by an afforestation and reforestation program. The Project had measured the diameter of tree at the breast height (1.3 m) and also recorded the height of three dominant trees in the sample plot. The PO has not changed the method for estimating aboveground biomass and belowground biomass in the MUs since the initial certification in 2015. Therefore, the Auditor accepts the method applied to the Project. We checked the excel files GS3260_5.7.10_CO2-Fixation workbook_SEPT2020.xlsx; CO2-Fixation workbook_Timber-Legacy_ratio_scenarios.xlsx; GS3260_5.7.9_HLH_InventoryResultsGrowthModel_2020_RevisedSEP2020.xlsx The Project identified Legacy and Timber models as management regimes and allocated 60% and 40% of the Planting Area, respectively. Previously, the ratio was 75% and 25%. The PO demonstrated that the change in the ratio positively impacted on the financial viability while the carbon performance reduces by 3.6%. Due to the update of the MUs, the PO had used 199 out of 240 sample plots for estimating the ex-post carbon fixation. The Auditors checked the

impacts on carbon fixation due to the change in the sample plots. We found a difference in total carbon fixation of 0.05%.

The following aboveground biomass (AGB) allometric equations by Baker et al. (2009) were consistently used:

a. AGB (kg) = 0.106 DBH^2.286 for the tree up to about 4 inch DBH b. AGB (kg) = 0.144 DBH^2.221 when tree DBH exceeds 4 inches.

The belowground biomass (BGB) allometric equation by Cairns et al. (1997) [BGB = exp(-0.7747+0.8836ln(AGB)] was used for estimating belowground biomass.

The above AGB and BGB allometric equations were applied to individual tree data from the sample plots.

The Project demonstrated a good fit of the new growth model by Vanclay (2009) and (2010) to the tree growth in the Project Area and replaced the growth model by Kent and Tranmer (2012) used in the initial certification.

The Project has decided to apply two thinnings to Timber and one thinning to the Legacy model with the final stocking of 400 trees per ha at the age 50 years in both models. The long-term carbon fixation was estimated to be 132 tCO2-e and 6 tCO2-e for Timber and Legacy models by taking an average of carbon fixation of in the rotation forestry pool over the 50 years (Figures 5 and 6).

Figure 5: Long-term CO2 fixation under the conservation forest and rotation forestry pool in Timber model

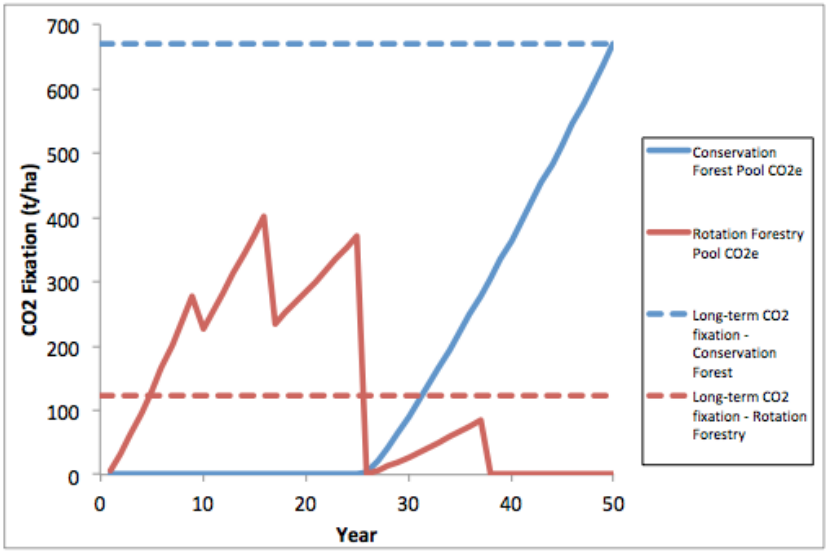
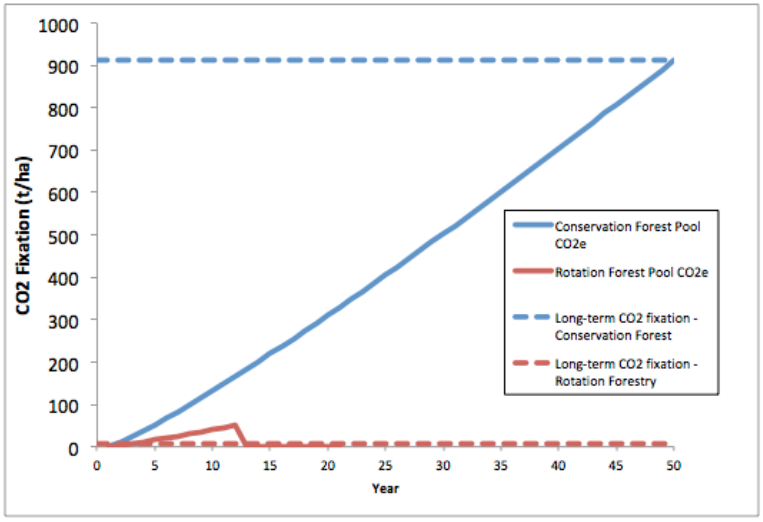
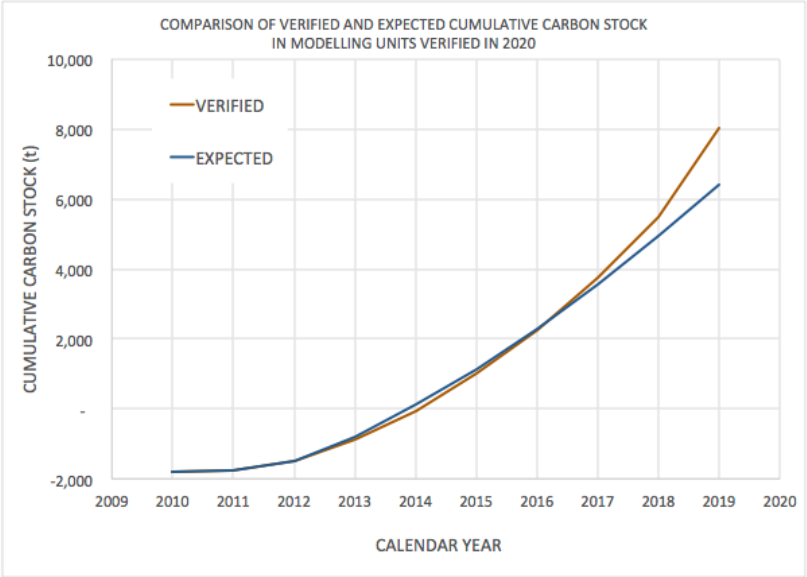


Figure 6: Long-term CO2 fixation under the conservation forest and rotation forestry pool in Legacy model

	 The estimation of the carbon fixation in the Timber model deducts 56 tCO2-e in the investors plot who did not provide the carbon rights to the Project. The PO has accounted for other emissions from nitrogen fertilizer use and deducted these from the carbon fixation to estimate net ex-post carbon fixation in the verification period. The Project calculated the standard error for the MUs planted between 2010-2014 and MU 10-L and 11-L exceeded the threshold of 20% with SE values of 27.2% and 23.2%. The carbon fixation from these MUs applied a deduction equivalent to the percentage difference to the threshold (20%). The Project had generated an ex-post carbon fixation of 8,267 tCO2-e by accounting ex-post carbon in MUs 10-L, 11-L, 12-L, 10-T, 11-T, 12-T, 13-T and 14-T in this verification period between 1st January 2015 to 28st February 2020. After deducting the carbon certificate issued in the initial certification (174 tCO2-e), the net verified carbon certificate is 8,093 tCO2-e (in cell FG32 of AnnualCO2Fix_IssuanceControl tab of GS3260_0_HLH Project CO2 credits by year_SEPT2020.xlsx) The Project has resulted in a validated carbon certificate of 266,151 tCO2-e from planting 336.7 ha in the 50 year crediting period (in cell L29 of MU Summary_Project tab of GS3260_0_HLH Project CO2 credits by year_SEPT2020.xlsx).
Relevant CAR/FAR/OBS	CAR 23/20
Status of CAR/FAR/OBS	CAR 23/20 is closed.
Conformance	Yes ☒ | No ☐

Risk Area 10	The Project has not provided a pathway to meet the performance shortfall in the case where ex-post carbon credits is lower than ex-ante estimation of carbon dioxide.
Audit Findings	The PO presented a comparison of the ex-ante and ex-post carbon fixation for the MUs in this reporting period (Figure 7). The Auditors checked the calculation and confirmed that the Project has no performance shortfall in this verification period. Figure 7: Comparison of ex-ante and ex-post carbon fixation in the MUs

	claimed in this verification 
Relevant CAR/FAR/OBS	CAR 23/20
Status of CAR/FAR/OBS	CAR 23/20 is closed.
Conformance	Yes ☒ / No ☐

Risk Area 11	The Project does not comply with the formatting as per the GS Principles and Requirement.
Audit Findings	The PO has used the formatting and template complying with the GS Principles and Requirement.
Relevant CAR/FAR/OBS	NA
Status of CAR/FAR/OBS	NA
Conformance	Yes ☒ / No ☐

6. Forward Action Requests (FAR) generated in this verification

FAR 01/20	
The PO has prepared the biodiversity monitoring plan (GS3260_3.1.17_BIODIVERSITY MONITORING PLAN.docx) in response to FAR 02/2015, which stipulates a monitoring frequency of every ten years after the commencement of the project in 2010. Hence, the biodiversity monitoring is due in 2020. The PO shall undertake biodiversity monitoring in 2020 as stipulated in the plan and submit the report to the auditor in the next verification.	
Due Date	At the next verification

FAR 02/20

We understand that the PO used the grid method and adapted to the field situation due to the irregular boundary of the MUs for determining the sample plot location. The Forest Inventory Instruction did not describe the technique, and the grid overlay may be subjective and involve biases in the sample plot selection. It is good practice to use pseudo-random number generator with a known seed number to locate the sample plot so that the Auditor or the third party can replicate and check the sample plot selection by applying the same method. To improve the consistency and data quality control, the PO is requested to elaborate on the sample plot selection, sampling intensity determination, data quality control procedure, record keeping and use of standard inventory form in the Forest Inventory Instruction document.	
Due Date	At the next verification

7. Assessment of compliance of project implementation and operation with the registered design

This verification assessed the HLH Project focusing on five issues outlined in section 1.1 by identifying 12 risk areas for assessing compliance of project implementation and operation with the registered design and GS requirements for A/R Projects. Following a review of the Project documents, 23 Corrective Action Requests (CARs) were raised to the Project. The Project Owner successfully addressed these CARs and they were subsequently closed. However, two Forward Action Requests (FARs) were issued to the Project to be addressed at the next verification. The Auditors did not find any non-compliance issue against the GS4GG requirements. Hence, this Project is found to be in compliance of the Project implementation and operation with the registered design.

8. Compliance of the registered monitoring plan with the methodology including applicable tools and standardized baselines

The Project is in compliance with the GS4GG A/R Methodology for accounting CO2 Fixation due to A/R activities.

9. Compliance of monitoring activities with the registered monitoring plan

This criterion is not applicable to this Project in this verification as this Project is transiting to GS4GG standard for A/R Project.

10. Compliance with the calibration frequency requirements for measuring instruments

The field crews confirmed that they check equipment before using in the field for any damage or malfunctioning.

11. Assessment of data and calculation of emission reductions or net removals or Relevant SDG impact

During the review of documentation, the Auditors checked the Project's tree count data and tree measurement data for their consistency and accuracy by triangulating the data between the data entry file and the CO2 Fixation file. The Auditors also verified the tree measurement data by obtaining the original field book and compared data in the excel. The calculation of CO2 Fixation was also thoroughly checked and the discrepancies found in the calculation were rectified and updated in the final document. Since the Project is transiting to the GS4GG standard for A/R Projects and will submit the relevant Sustainable Development Goal (SDGs) and the monitoring plan in the transition template to the GS. The impact assessment of SDGs is not applicable at this verification.

12. Assessment of reported sustainable development co-benefits and Safeguards

Hawaiian Legacy Hardwoods (HLH LLC) aims to restore a natural ecosystem in the Kukaiau Ranch by planting a mixture of native species. The Project has planted 268.4 ha in 18 MUs since 2010. Since the Project is in transition phase to GS4SS, the Project does not require reporting sustainable development co-benefits and safeguards. Hence, the sustainable development co-benefits and safeguards are not assessed in this verification.

13. Internal quality control

One member of the audit team conducted an internal review of the verification report for Quality Assurance and Quality Control (QAQC) purposes. The internal reviewer examines the verification report (draft) and ensures that the methodological requirements of the GS4GG for A/R project have been assessed for compliance and the document meets the reporting requirement of the Gold Standard. The Auditors finalize the verification report after resolving any issues identified by the internal reviewer.

14. Verification opinion

The verification process (refer to section 3) applied HLH Project demonstrated overall compliance with the requirements for the GS4GG for A/R Project, based on the evidence from the submitted template and supporting documents. The Project Owner successfully resolved all 23 corrective action requests (CARs) issued in the audit process and two Forward Action Requests (FARs) from the previous verification. As a result, this audit concludes a reasonable assurance in regards to the implementation of the A/R project activities as per the Gold Standard and confirms verification of CO2-Fixation in the reporting period from 1st January 2015 to 28th Feb 2020 as summarized below:

Long-term $CO_{2\text{-}e}$-Fixation over 50 years (based on growth Model (Ex-ante)	Verified $CO_{2\text{-}e}$-Fixation (Ex-post) for the reporting period (1 Jan. 2015 to 28th Feb 2020)
266,151 tCO2-e	8,093 $tCO_{2\text{-}e}$ (net)

Annex 1:

List of project documents reviewed by the Auditor

2.1 Key Project Information
GS3260_2.1_Key Project Information_AUG2020.docx
GS3260_2.1_Key Project Information_FEB2020.pdf
GS3260_2.1_Key Project Information_Revised Apr15.pdf
GS3260_2.1_Key Project Information_SEPT2020.pdf
GS3260_2.1.2_Photo of boundary fence.pdf

3.1 Do-no-harm Assessment
GS3260_3.1_Do-No-Harm Assessment_FEB2020.pdf
GS3260_3.1_Do-No-Harm Assessment_Revised Feb15_Changes saved.pdf
GS3260_3.1.1_B_Corporation_Certificate.pdf
GS3260_3.1.2_B Lab Assessment_HLH_June 2013.docx
GS3260_3.1.3_HLH Employee Handbook.pdf
GS3260_3.1.4_HLH Safety Manual.doc
GS3260_3.1.5_Map of regional conservation reserves.doc
GS3260_3.1.6_Map of conservation areas planted 2010-13.pdf
GS3260_3.1.7_Endangered Species Survey.pdf
GS3260_3.1.8_Handbook acknowledgment.pdf
GS3260_3.1.9_Overview of HI workers compensation provisions.pdf
GS3260_3.1.10_Worksite hazard training document.doc
GS3260_3.1.11_HLH Chemical Pesticides Policy.docx
GS3260_3.1.12_HLH_SOP_Chemical pesticide use.docx
GS3260_3.1.13_HLH_SOP_Chainsaw use.docx
GS3260_3.1.14_ALTRES PEO Relationship.pdf
GS3260_3.1.15_Employees acknowledge receipt of Altres letter.pdf
GS3260_3.1.16_Overview of training delivered FEB15.docx
GS3260_3.1.17_BIODIVERSITY MONITORING PLAN.docx
Independent Contractor agreement with HLH.pdf

3.2 Local Stakeholder Consultation
GS3260_3.2_Local Stakeholder Consultation_FEB2020.pdf
GS3260_3.2_Local Stakeholder Consultation_Revised Feb15_Changes saved.pdf
GS3260_3.2.1_Invitees to LSC.xlsx
GS3260_3.2.2_Employee Benefits Brochure.pdf
GS3260_3.2.7_HLH Input and Grievance Policy and Procedure.docx
GS3260_3.2.10_Workers acknowledge receipt of Input and Grievance Policy.pdf
GS3260_3.2.11_Minutes of meeting with Jason Cordoza re Input and Grievance proceedure.docx

3.5 Project Participants & Secured Titles
3_5-Template-Project-Participants-Secured-Titles-Final.docx
3.5_Project Participants & Secured Titles_Revised Feb15_Changes saved.pdf
3.5.1_Document of Good Standing.docx

3.5.2_KUKAIAU RANCH LLC_Business Registration.pdf
3.5.3_KUKAIAU RANCH LLC_Certificate of Good_Standing.pdf
GS3260_3.5_Cover Letter_newAreaCertification_FEB2020.docx
GS3260_3.5_Project Participants & Secured Titles_FEB2020.pdf
GS3260_3.5_Project Participants & Secured Titles_SEPT2020.pdf
GS3260_3.5.4_Tree Owner Consent for HLH to manage carbon.docx
GS3260_3.5.5_2016 investor agreement.pdf
GS3260_3.5.6_LC-TFR_agreement_May2019.pdf

3.5 Sustainability Monitoring Plan / Annual Reports

GS3260_3.5_Sustainability Monitoring Plan_FEB2020.pdf
GS3260_3.5_Sustainability Monitoring Plan.pdf
GS3260_3.5.1_Employee interview records.xlsx
GS3260_3.5.2_Soil C Sample Results 2020.xlsx
GS3260_3.5.3_Species planted since 2015.xlsx
GS3260_Annual Report_2015.docx
GS3260_Annual Report_2016.docx
GS3260_Annual Report_2017.docx
GS3260_Annual Report_2018.docx
GS3260_Annual Report_2019.docx
HLH Employee Census with Home Costing By Date.xlsx
Ranch Hands 2015-19.xlsx

3.6 Risk Register

GS3260_3.6_Risk Register_FEB2020.pdf
GS3260_3.6_Risk Register.pdf
GS3260_3.6.1_Koa agroforestry paper.pdf
GS3260_3.6.2_Hurricane risk assessment by HLH.docx

4.1 Additionality

GS3260_4.1_Additionality_FEB2020.pdf
GS3260_4.1.5_Final Kulaiau Lease Agreement.docx
GS3260_4.1.6_HLH Spring 2009 newsletter.doc
GS3260_4.1.7_Email thread between LR and TP.docx

5.1 Applicability

GS3260_5.1_Applicability_FEB2020.pdf
GS3260_5.1_Applicability.pdf
GS3260_5.1.1_Baseline scenario carbon_project level.xlsx

5.4 Other Emissions

GS3260_5.4_Other Emissions_FEB2020.pdf
GS3260_5.4_Other Emissions_SEPT2020.pdf
GS3260_5.4.1_Nitrogen emissions workbook_Revised Feb2020.xlsx
GS3260_5.4.1_Nitrogen emissions workbook_Revised OCT2020.xlsx
GS3260_5.4.2_Chemical purchases 2010-2019.xlsx

5.5 Baseline

GS3260_5.5_Baseline_FEB2020.pdf
GS3260_5.5_Baseline_SEPT2020.pdf
GS3260_5.5.1_Baseline carbon report_Treehouse Consulting_Revised Feb15.docx

5.6 Leakage

GS3260_5.6_Leakage_FEB2020.pdf
GS3260_5.6_Leakage.pdf
GS3260_5.6.1_Forest cover change on Hawai`i.png
GS3260_5.6.2_Expert opinion on forest clearing for ranching.docx

5.7 CO2 Fixation

GS3260_0_HLH Project CO2 credits by year_Revised JUNE15.xlsx
GS3260_0_HLH Project CO2 credits by year_SEPT2020.xlsx
GS3260_5.7_CO2-Fixation_Revised AUG 2020.docx
GS3260_5.7_CO2-Fixation_Revised FEB 2020.pdf
GS3260_5.7_CO2-Fixation_Revised Feb15.docx
GS3260_5.7_CO2-Fixation_Revised Mar15_Changes Saved.pdf
GS3260_5.7_CO2-Fixation_Revised SEPT2020.pdf
GS3260_5.7.1_HLH Inventory for Timber MUs 2010-12_Revised Feb15.xlsx
GS3260_5.7.2_Growth model and CO2-Fixation workbook_Revised Feb15.xlsx
GS3260_5.7.3_Excerpts from Kent 2012_Growth prediction.docx
GS3260_5.7.4_Inventory process_Revised Feb15.docx
GS3260_5.7.5_Elevitch et al 2006_Koa species profile for Pacific Island Agroforestry.pdf
GS3260_5.7.6_Teobaldelli etal 2009_Generalised functions for BEFs.pdf
GS3260_5.7.7_Foregone lumber carbon_updateSEPT2020.xlsx
GS3260_5.7.7_Foregone lumber carbon.xlsx
GS3260_5.7.8_HLH growth model report_FEB 2020.docx
GS3260_5.7.8_HLH growth model report_RevisedSEPT2020.docx
GS3260_5.7.9_HLH InventoryResults & GrowthModel_2020.xlsx
GS3260_5.7.9_HLH_InventoryResultsGrowthModel_2020_RevisedSEP2020.xlsx
GS3260_5.7.10_CO2-Fixation workbook_AUG2020.xlsx
GS3260_5.7.10_CO2-Fixation workbook_FEB2020.xlsx
GS3260_5.7.10_CO2-Fixation workbook_SEPT2020.xlsx
GS3260_5.7.11_Vanclay2009.pdf
GS3260_5.7.12_Vanclay 2010.pdf
GS3260_5.7.13_Inventory 2019 protocols.docx

6.1 Carbon Performance

GS3260_6.1_Carbon Performance.pdf

Additional Documents_AugSept2020

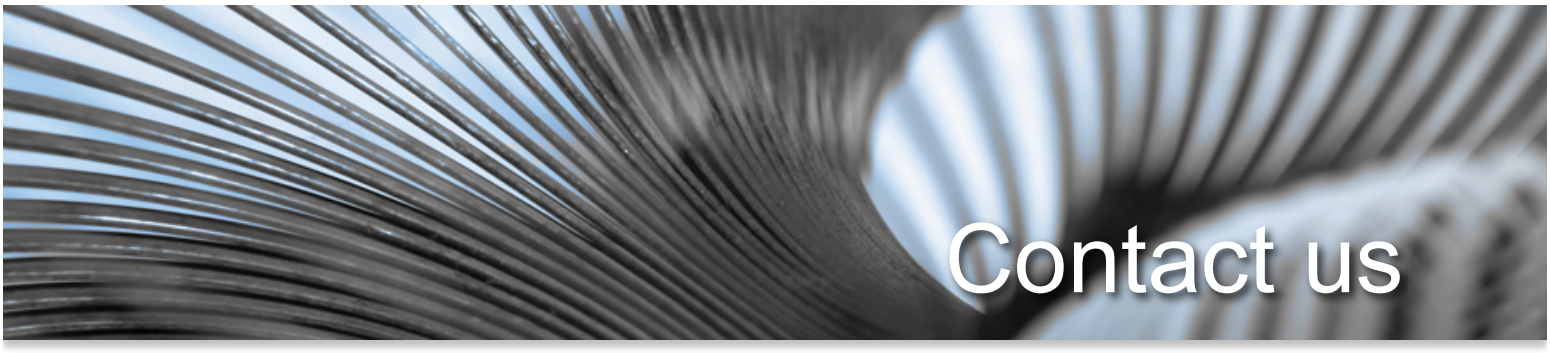
5.Plot data entry form_Example completed Callister.xlsx
6.0_Additional documents_pictures.xlsx
6.1_photo from lookout_16May2019.pdf
6.1.1_photo from lookout_January2015.jpg
6.2_photo from lookout_16May2019.JPG

6.3_Sandalwood.JPG
6.4_8yr koa.JPG
6.5_Overview_31May2019.JPG
6.6_MU15T.JPG
6.7_Hawk.jpg
6.8_MU13T.JPG
6.9_MU14T.JPG
8.0_Explanation of nursery photos.docx
8.1_Nursery_GE_Feb2010.png
8.2_Nursery_GE_July2011.png
8.3_Nursery_GE_Dec2011.png
8.4_Nursery_GE_Jan2013.png
8.5_Nursery_GE_Dec2017.png
8.6_Umikoa Nursery.mp4
8.7_koa seedlings.jpg
8.8_Sandalwood seedlings.jpg
9.1_fencing team.jpg
9.2_loading road surface.jpg
10.1_11T_8yrs.jpg
10.2_12T_7yrs.jpeg
10.3_13T_6yrs.jpeg
12.Nursery production records.xlsx
13.1_Echotech nursery invoice to HLH_2015.pdf
13.2_Echotech nursery invoice to HLH_2016.pdf
13.3_Echotech nursery invoice to HLH_2017.pdf
13.4_Echotech nursery invoice to HLH_2018.pdf
14.Field planting records.xlsx
15.1_CREP summaries of new area planting.xlsx
16.SUMMARY_PESTFERT_USE_2010-2019_2.xlsx
Additional documents_pictures.xlsx
EligiblePlantAreaChanges
Employee Interviews
HLH_Request for Information_v1.0.xlsx

Final Geospatial Files
Shapefiles_2020_V1
Shapefiles_2020_V2
Shapefiles_2020_V3

Final Geospatial Files (Shapefiles_2020_V4)
LeaseArea_SEPT2020.shp
ProjectArea_SEPT2020.shp
EligiblePlantingArea_SEPT2020.shp
PlantingArea_SEPT2020.shp
Infrastructure_SEPT2020.shp
RemVeg_SEPT2020.shp
SmallAreas_SEPT2020.shp

FutureBuilding_SEPT2020.shp
10-L-SEPT2020.shp
11-L-SEPT2020.shp
12-L-SEPT2020..shp
13-L-SEPT2020.shp
14-L-SEPT2020.shp
15-L-SEPT2020.shp
15-L-SEPT2020.shp
16-L-SEPT2020.shp
18L-SEPT2020.shp
21-L-SEPT2020.shp
22-L-SEPT2020.shp
23-L-SEPT2020.shp
24-L-SEPT2020.shp
10-T-SEPT2020.shp
11-T-SEPT2020.shp
12-T-SEPT2020.shp
13-T-SEPT2020.shp
14-T-SEPT2020.shp
15-T-SEPT2020.shp
16-T-SEPT2020.shp
17-T-SEPT2020.shp
18-T-SEPT2020.shp
21-T-SEPT2020.shp
22-T-SEPT2020.shp
GS3260_satellite2019_georef_11Sept.tif



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