Human Induced Regeneration method explained

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Introduction

Increasing the amount of carbon that is removed from the atmosphere and stored in vegetation and soil over time is one of many approaches that can be employed to help reduce emissions and tackle climate change. There are a myriad of approaches to removing carbon from the atmosphere, which deliver on this objective to varying degrees of scale.

The proven efficacy of any one of these methods is therefore reliant on the manner and extent to which the amount of carbon removed can be quantified.

In Australia, there are a number of these approaches that the Clean Energy Regulator (Regulator, or CER) accepts as being eligible - or approved - methods for carbon abatement (removing and reducing carbon [carbon dioxide] from the atmosphere) and sequestration (storing carbon) in vegetation or soil.

A specified approach becomes a methodology once the ways that carbon sequestration can be achieved and quantified are developed by the CER and then endorsed by the Emissions Reduction Assurance Committee (see below) to the Federal Minister for Energy and Emissions Reductions.

Once an eligible methodology has been used to generate and carbon abatement, the CER can issue one Australian Carbon Credit Unit (ACCU) for each one tonne of carbon1 shown to have been sequestered. In other words, calculation of the outputs, through compliance with the requirements of the method, is accepted as evidence that carbon abatement has taken place.

Structure of the Australian carbon market

The Australian carbon market operates through a regulated scheme, established under the Carbon Credits (Carbon Farming Initiative) Act 2011 (CFI Act) and administered by the Clean Energy Regulator.

The issuance of ACCUs is governed by the CFI Act, the Carbon Credits (Carbon Farming Initiative) Regulations 2011 (CFI Regulations), and the Carbon Credits (Carbon Farming Initiative) Rule 2015 (CFI Rule).

The CFI Act sets out a rigorous process for the approval, review and revocation of methodologies. Methodologies are statutory instruments made by the Federal Minister for Energy and Emissions Reductions (Minister).

The CFI Act also establishes the Emissions Reduction Assurance Committee (ERAC) which has the role of reviewing methodologies, and making recommendations to the Minister as to whether the methodologies comply with the offsets integrity standards (explained below).

For further information please refer to the CMI's Integrity in the Australian Carbon Market Explainer.

[1] Each ACCU issued actually represents one tonne of 'carbon dioxide equivalent (tCO2-e)' stored or avoided by a project. In this document, CO2-e has been shortened to 'carbon' for ease of explanation. CO2-e is a measure of greenhouse gas emissions. Greenhouse gas emissions are measured as kilotonnes of CO2-e. This means that the amount of a greenhouse gas that a business emits is measured as an equivalent amount of carbon dioxide which has a global warming potential of one. For example, one tonne of methane released into the atmosphere will cause the same amount of global warming as 25 tonnes of carbon dioxide. So, the one tonne of methane is expressed as 25 tonnes of carbon dioxide equivalence, or 25 t CO2-e. (http://www.cleanenergyregulator.gov.au/NGER/About-the-National-Greenhouse-and-Energy-Reporting-scheme/Greenhouse-gases-and-energy)

Human induced regeneration (hir) and carbon abatement

What is HIR?

Human Induced Regeneration (HIR) projects are designed to regenerate parts of a property where vegetation has previously been suppressed by at least one of the following; unmanaged livestock grazing, feral animal activity, plants not native to the area or the mechanical and/or chemical destruction of regrowth. Essentially, these projects operate by adjusting land management practices so that the native vegetation can regenerate and therefore store (abate and sequester) carbon.

Though HIR projects are primarily run for the purposes of carbon abatement, they also provide the secondary or co-benefit of rehabilitating and improving the agricultural properties on which they are conducted.

To be eligible under the ERF, HIR projects must involve one or more of five activities:

1. management of the timing and extent of livestock grazing;
2. exclusion of livestock and taking reasonable steps to keep livestock excluded;
3. management of feral animals;
4. management of plants that are not native to the project area; or
5. cessation of the mechanical or chemical destruction of regrowth.

Though, along with other Emissions Reduction Fund (ERF) projects, HIR is part of a suite of eligible methods that each make an important contribution to the global fight against climate change, these approaches are not designed or intended to be the only solution.

Australia's carbon credit scheme is widely considered to be world-leading. This is partly because it requires that each project be verified by independent audit and external review so that the level of regeneration and carbon abatement being achieved can be demonstrated and recorded against the outcomes projected at the beginning. At the same time, these checks and balances also provide assurances that can encourage new entrants, as well as provide learning and improvement opportunities for those already participating. Ultimately, this system of scrutiny contributes to the high level of integrity associated with Australia's overall carbon credits system.

HIR and measurement

The amount of carbon sequestered under the HIR method is quantified using the Full Carbon Accounting Model (FullCAM), a computer simulation tool for determining Australia's greenhouse gas emissions from the land sector. The FullCAM model determines the changes in amounts of carbon stored in ecosystems by combining data about changes in land (and canopy) cover, land use/management, climate, and primary (plant) productivity over time to calculate the amounts of carbon being abated.

Though HIR activities are typically implemented at the paddock scale (i.e. per paddock) across large parts of a landholder's entire property, abatement quantification and crediting is restricted to specified smaller areas on the property called **'carbon estimation areas' (CEAs)**. These are the defined portions (spatial areas) of land that meet each of the specific requirements of the methodology. These portions of land constitute the actual HIR project area. These CEAs are closely monitored to gather evidence of the amount of carbon being sequestered, and are the only areas on the entire property that contribute to the calculation of carbon credits. This is despite the fact that, with the same activities being carried out across the other large areas of the property, carbon is also being sequestered outside of the CEA boundaries. These parts of the property, which are often managed the same way as the CEAs, are effectively buffers. Together, they and the CEAs constitute the **project area.** Sometimes this can be the entire property from boundary to boundary.

Additionally, only certain outcomes that result in carbon being sequestered, as part of HIR, are quantified - for example, increases in the live and debris biomass. Other outcomes from implementing HIR project activities may result in carbon sequestration (such as increased soil carbon) in a CEA, but cannot be included in abatement estimations, according to the accounting rules for this method.

These strict assessment criteria mean that the calculated amount of carbon abated under the HIR method should be conservative in nature ie, it is designed to be understated. ACCUs are generated following the submission and approval of an offsets report which outlines the calculations used to determine the amount of abatement that has been achieved by the project activities. These reports are produced at intervals throughout the project's life cycle and are assessed by the CER against specific criteria, including that the project activities and abatement calculations have been carried out in accordance with the methodology.

These reports are audited by independent, third-party auditors, and the audit provided to the CER as well. The CER also has the power to commission an audit of a project at any time.

Integrity standards

Conservative estimates, projections and assumptions - which ultimately combine and feed into conservative measurements - are one of the six criteria, or 'integrity standards', that abatement and sequestration methods must comply with in order for the CER to continue to accept them as being eligible.

Conservative measurement is one of the criteria that ensures the amount of carbon the method claims to abate and sequester is not overstated or inflated. This means that there is high assurance and confidence that the method is doing what it says it does, and that ACCU buyers are getting what they pay for, i.e., a tonne of carbon emissions being removed from our atmosphere per credit.

The six offsets integrity standards are:

1. **Eligible carbon abatement** – carbon abatement achieved under the method should be able to be used to meet Australia's international mitigation obligations, i.e., the abatement credited under the method should be from carbon sources and sinks that Australia accounts for under the Kyoto Protocol and Paris Agreement - which is the case with HIR;
2. **Evidence-based** – development and design of the method must be supported by clear, convincing, robust evidence of the impact of the abatement activity on emissions and removals;
3. **Measurable and verifiable** – the method must contain rigorous and reliable ways for all carbon removals, emissions reductions and emissions released by the project to be measured or estimated, and be robustly verified;
4. **Project emissions** – carbon emissions released by the project as a direct or indirect result of activities to run abatement and sequestration methods should be deducted;
5. **Conservative** – in the spirit of caution and avoidance of overstating outcomes: estimates, projections and assumptions should be conservative so that, ultimately, measurements and outcomes are as well;
6. **Additionality** – it should be demonstrable that the carbon abatement are a result of application of the method (at least one of the five eligible HIR activities, described earlier) and would not have happened in the ordinary course of events: i.e., the activities that constitute the method have caused the abatement to take place - and if they had not been undertaken, carbon abatement and sequestration would not have happened.

Establishing that a property is eligible for a HIR project

For a project to be considered eligible for the HIR method, it must be demonstrated that the areas being proposed as CEAs have not been forest (defined as 2m in height and covering 0.2ha) at any point during the preceding 10 years. This decade is referred to as the **baseline period**.

Documentary evidence in support of the baseline period must be submitted to the CER, demonstrating that growth of forest in the area of land has been suppressed by either domestic stock, feral animals, invasive non-native weed species or mechanical or chemical clearing.

It is important to note that the way in which baseline suppression of vegetation can be proved differs from project to project, according to a host of circumstances and variables that vary from property to property.

At the same time, in order for an HIR project to be eligible, the area must contain some level of vegetation to evidence that there is '**forest potential**'. The ERF considers at least 5% canopy cover per 1000ha at the time of initial report to be an indicator that the area has the capacity to adequately regenerate and therefore be a CEA - that it has forest potential.

They are then managed in a way that ensures '**forest cover**' (i.e. 20% canopy cover) is achieved within 15-20 years.

This is done by implementing a '**management plan**' for the CEAs in the project, which will feature at least one of the five activities that the ERF considers makes a project eligible.

What is 'ground truthing'?

At the commencement of project planning, a landholder's property is assessed to determine which areas may have existing forest cover (and must therefore be excluded) and which may be eligible to be a CEA. To achieve this, the property is divided into different strata based on the level of canopy cover and likeliness of supporting vegetation. HIR Guidelines, released by the CER in 2019, require this process to be completed using satellite imagery. [2]

Ground truthing surveys are carried out in the field by GreenCollar to validate the satellite stratification.

The satellite stratification is further divided into survey plots that represent the variation in the landscape, where data about total stem count, count of stems over 2m, count of stems below 2m of species with forest potential, and count of stems below 2m of species without forest potential is recorded.

If any of these assessments prove different to the satellite classification, further information is recorded, for use in potential re-classification. This includes stem count, age-structure, species mix, size, connectivity, field photos and field comments. Once reclassified, this information is then used to refine and provide quality control for the entire classification, measurement and forecasting process.

Further assessment of canopy cover, mapping accuracy, and biophysical risk (terrestrial carbon cycle disturbances such as fire, drought, heat stress and variable grazing pressures) is also undertaken before this process is complete.

Ground truthing usually takes two to three weeks to ensure robust data collection and is dedicated to ensuring accuracy, rigour and integrity in HIR projects.

GreenCollar takes this aspect of project design and management very seriously and has concerns that some other operators do not execute this aspect of a project with the same level of rigour, in terms of execution or time. The ultimate risk is that the integrity of the carbon farming sector suffers.

Timeline and measuring progress of projects

CFI legislation dictates that a project will be credited for 25 years from the date on which the project is registered with the CER (the **crediting period**). This date is the project start date (PSD), before which no project activities, which will result in the regeneration to be measured, have commenced[3].

The **model start date (MSD)** is the date when sufficient regeneration has occurred to demonstrate forest potential.

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[2] Since 2019 (via a CFI Rule change and release of regulatory guidance) it has become a formal requirement for; a) the final CEA boundaries reported on in the initial crediting application to be verified by on-ground data collection, and b) CEAs to meet regeneration performance benchmarks in order to ensure the FullCAM calculations and thus credits are aligned with the genuine carbon abatement occuring on the ground. These performance benchmarks (see gateway checks, below) are assessed via canopy cover percentage thresholds at different spatial scales dependent on the age of the project.

[3] Make sure your timing is right A guide to crediting, reporting, delivery and permanence periods V 2. July 2016

The MSD is the zero point for the CEA against which subsequent levels of regeneration (canopy cover) are compared.

Further, final project design and therefore, a final abatement forecast, cannot be completed until after a comprehensive ground truthing survey is conducted, as evidence of the baseline picture on the PSD and MSD.

The main technical goal of HIR projects is to achieve an evenly distributed canopy cover of 20% of each hectare of the CEA. This must be achieved by year 15-20 of the 25-year crediting period and is measured against benchmarks at five year intervals.

Canopy cover assessments, or 'gateway' checks, are conducted six, 10 and 15 years after the MSD. At these gateway check points, measurement of regeneration must show a minimum of:

- at six years: at least 7.5% of every 100ha of the CEA must have canopy cover
- at 10 years: at least 10% of every 10ha of the CEA must have canopy cover
- at 15 years: at least 20% of every 0.2ha of the CEA must have canopy cover - and this must apply to 90% of the entire CEA (using 90% instead of 100% allows for a margin of error).

If the gateway checks find that the growth forecasts for a CEA have not eventuated, these areas of land may be excluded from the project. Though, in cases where the CEA has been exposed to events such as fire or drought, which have caused the shortcoming, a growth pause may be granted. This would mean the CEA is granted a set period of years to catch up to the forecast, setting the project back by the same period. In this regard, it is imperative that to get CEA design right at the outset.

Increases in forest canopy must be demonstrably attributable to activity that has taken place as part of the HIR project. Any regeneration that would have happened without the project is not eligible to generate abatement under the current methodology. On this basis, these activities need to pass the tests of newness and additionality.

At the conclusion of the 25 years crediting period, the project continues through its '**permanence period**'. This is the period over which carbon must continue to be maintained in the CEA at the same level, ordinarily 100 years including the crediting period. Another way of looking at this is that the permanence period is the period of time during which this area of land is protected and only used for these project activities. (If the project chooses to limit the length of the permanence period to 25 years, it will incur a 20% reduction in the carbon credits it can see issued.) [4]

Newness and additionality

The ERF is only intended to fund new carbon abatement and sequestration projects, which does not include activities that may have already been under way before the PSD.

For the purposes of establishing newness and additionality, a distinction needs to be made between the business as usual activities, which were undertaken during the baseline period, and those that will be undertaken as part of the HIR project.

On this basis, evidence that might demonstrate this 'newness', from the PSD onwards, might include:

- a carbon management plan which outlines the intended changes to be implemented as part of the project;
- evidence of infrastructure upgrades (boundaries/ waters/ trap yards);

[4] Carbon stored in vegetation and soils can be released back into the atmosphere by man-made or natural events, thereby reversing the environmental benefit of the sequestration project. Sequestration is regarded as permanent if it is maintained on a net basis for 100 years. A risk of reversal buffer applies to all sequestration projects and reduces the carbon abatement issued during a reporting period by 5 per cent. This means that for every 100 tonnes of carbon stored by a sequestration project only 95 Australian carbon credit units will be issued, instead of 100 if the project is a 100-year permanence period project. A further 20 per cent deduction of Australian carbon credit units will be made for 25-year permanence period projects. (http://www.cleanenergyregulator.gov.au/ERF/Choosing-a-project-type/Opportunities-for-the-land-sector/Risk-of-reversal-buffer)

- reductions or changes in stocking rates and grazing management (eg. grazing management plans that define the timing and extent of HIR grazing activity);
- maps showing proposed upgrades; and/or
- evidence of increases in goat or feral animal harvesting.

In order to satisfy the requirement of additionality, not only must an activity or land management change be 'new', but in ordinary circumstances:

- it should be demonstrable that the land management changes would not have occurred without the HIR project;
- the changes should not be required by law or government mandate; and
- the changes should not be something that is carried out under a local, state or Commonwealth government program or scheme.

This will show that they are 'additional' to normal or required practices.

Criticisms and concerns raised over the effectiveness of HIR projects

Despite these standards and processes put in place to produce and evidence integrity, criticisms remain.

The most basic criticism is that carbon credits are created out of thin air and really don't achieve anything

The ACCU-producing projects run by GreenCollar with partner landholders produce and record evidence on an ongoing basis. This evidence demonstrates, not only the tangible existence of carbon abatement and sequestration, but the very high integrity of the projects. They are rigorously measured, reviewed and audited throughout - subjected to ongoing scientific and regulator scrutiny.

This rigour starts at the beginning. An HIR project cannot meet eligibility requirements unless it can provide evidence that, during the baseline period, the growth of forest cover had been suppressed by either domestic stock, feral animals, invasive non-native weed species or mechanical or chemical clearing. Then, a **management plan** is put in place to guide the achievement of 'forest cover' within the first 15 years of the 25 year project. This is a plan to target, reduce and manage the suppression factors that have characterised the baseline period, as well as to ensure that the growth that has been forecast takes place as the project proceeds. It is at this point that ground truthing is usually undertaken in order to record the actual profile of vegetation in the CEA.

As one ACCU represents one tonne of carbon removed from the atmosphere, in order for issuance to take place, the method requires data collection, validation, independent auditing and reporting to the Clean Energy Regulator. This occurs throughout the life of the project.

In addition to regular auditing, the 5-year 'gateway checks' ensure that tree growth and carbon abatement capacity have been correctly estimated, are taking place as forecast, and that there hasn't been removal or destruction by fire. These are rigorous, regular and robust checks on the scientific performance of the projects, the accounting for the removal of carbon from the atmosphere and the correct issuance of ACCU as consideration for that work.

For example, in terms of HIR projects: GreenCollar's experienced team invest significant time and resources in developing the science-based evidence needed for assessment by independent auditors, who take an average of 100 hours and six-weeks to analyse project information and undertake on-land assessments before assurance can be achieved and ACCUs issued.

This data collection, validation and verification in relation to the on-ground projects act as integrity measures in addition to the protections built into HIR method itself.

GreenCollar has a 100% compliance conclusion record by independent[5] auditors across all projects. On this basis, we are confident of the robustness of our own science-based approach to project efficacy, monitoring and reporting, and the high integrity of our own projects.

Another over-arching criticism is that the method is not being carried out effectively

Because existing HIR and other ERF projects have provided and continue to provide an important contribution to the global fight against climate change, it is in everyone's interests that these projects do what they say they are going to do. It is imperative that the industry encourages and learns from scrutiny of methods, projects and accounting. It is this external, independent review and scrutiny which underpins the integrity of Australia's world leading system.

At the same time, it is important that criticism and media commentary emanates from a proper and correct understanding of the scientific basis of the models, and actual data, rather than from conjecture and misunderstanding.

ACCUs are generated using scientifically founded and independently verified processes and procedures. These processes and procedures - indeed the overall method itself - have been rigorously interrogated, improved and reported upon in recent years, with the outcome in each case being strong positive endorsement and validation of integrity.

Criticism that the method is not being carried out correctly essentially encompasses a number of key points:

- that the vegetation in the project location and CEA at baseline is either: not consistent with being able to regenerate; or too vulnerable to pressures that would prevent it doing so over the crediting period and the permanency period;
    - in other words, locations that cannot grow forest are chosen for regeneration;
- that pre-existing mature vegetation is being captured in the results;
- that measurement of carbon abated and sequestered is either: incorrectly captured in the CEA; or taken from the entirety of the property on which the project is being run; or
- that HIR results that are attributed to additionality are actually a result of the impacts of rainfall and climate.

Criticism 1: Locations that cannot cannot grow forests are chosen for regeneration

This criticism contends that the vegetation in the project location and CEA at baseline is either:

- not consistent with being able to regenerate; or
- too vulnerable to pressures that would prevent it doing so over the crediting period and the permanence period.

In reality, this is unlikely to be the case because an area of land found to consist of this sort of vegetation would either mean that it would have to be disqualified from being a CEA at the outset, through ground truthing, or removed from the carbon project when a gateway check is performed.

[5] About the National Greenhouse and Energy Reporting scheme

At the outset of the project, the model used to qualify an area of land as a CEA under the HIR method specifically requires that a certain amount of vegetation be present at the beginning of the project in order to establish that it actually has the capacity to regenerate.

The three core requirements are that the area of land:

1. has "**forest potential**" – this means that at the start of the project, the land has some trees;
2. is not completely bare – specifically, this requires that it has at least 5 tonnes of biomass per hectare at the start of the project (5% canopy cover); and
3. is reasonably likely to achieve "**forest cover**" (i.e. a minimum of 20% canopy cover, which is at least 2 metres high over a minimum area of 0.2 hectares) by year 15.

Then, when the HIR carbon project commences, the management plan is put in place to target, reduce and manage suppression factors with the aim of achieving "forest cover" within the first 15 years of the 25 year project.

Additionally, research has been conducted to interrogate the extent to which the features of the method, and their application, protect against factors, or risks, that would cause this vegetation not to regenerate.

Research released by the CSIRO in 2020, entitled '*Technical review of physical risks to carbon sequestration under the Emissions Reduction Fund (ERF): Final Report to the Climate Change Authority*' found the two methods devoted to the re-establishment of native forest cover, including HIR, are highly robust with strong integrity:

> "The key stage of vulnerability for these projects is during the establishment and early years of growth. The embedded methodological requirements of having to demonstrate a potential for forest cover to be achieved (through e.g. evidence of seedlings or young regrowth), and for having to demonstrate advancement of the vegetation towards forest cover over time, provides strong mitigation against the impacts of climate change on the vulnerable early stages of regeneration."

In other words, the processes in the method which, when applied, indicate if an area features vulnerable vegetation that is unlikely to successfully regenerate, are strong. Such an area would therefore not be utilised as a CEA. The method requires not only that potential for early growth be established at commencement, but that gateway checks provide the assurance that the projected growth is actually taking place.

This finding is significant, given that the research from which this report was drawn found the risks of vegetation not being able to accumulate carbon during the growing/ crediting period, and/or not being able to maintain it during the permanence period, were as follows:

> "From the perspective of **abatement accumulation**, the main risks are associated with changes in the climate that affects the survivorship of young regenerating stands, and the growth rates of mature stands. The main drivers were identified to be changes in average and maximum temperature, and the associated variables potential evapotranspiration and relative humidity, which have the potential to reduce net primary productivity, and hence rates of carbon sequestration.
>
> "Regarding **abatement maintenance**, the main risk factor identified was from mortality associated with extreme drought, although the ultimate consequences for carbon abatement are uncertain as they are a function of the combined rates of subsequent debris decay and other losses (such as from termites), and rates of post-drought recovery. The drought risk is exacerbated through the regional concentration of projects in north west New South Wales, and south west Queensland. Because fire is not a major feature in the areas where these activities have been established, or are likely to be established in the future, it was not considered a significant risk factor, although fire does occur within the region, and hence individual projects should have in place appropriate fire management plans."

These findings are in effect saying that the management plan and associated forecast for the project, in taking these risks into account, means that the likelihood of growth taking place - of carbon abatement accumulating and maintaining - will be robust and highly reliable.

Criticism 2: Pre-existing mature vegetation is being captured in the results

Exclusion of existing forest is the most heavily scrutinised area of the HIR method and subject to rigorous design, measurement and accounting.

As explained, it is critical to understand that the methodology specifically requires a certain amount of vegetation to be present,at the time of the initial stratification and modelling commencement, in order to establish that it has forest potential and actually has the capacity to regenerate.

On top of the three core requirements described above, land is only considered eligible if it has not achieved 'forest cover' at any time in the preceding ten year baseline period - and, as explained, this needs to have been evidenced before commencement of the project and issuance of ACCUs.

In actuality, at the start of an HIR project, an area of land that has met these tests would generally feature small saplings, seedlings and grasses. There might be a few scattered trees left, which provide shade and shelter, but regrowth across the area of land would have been kept down by cattle and/or feral herbivores walking over it, breaking it at the root and grazing, or by land clearing activity (i.e., 'suppression', meaning that trees have not gotten the chance to grow and reach forest cover).

(Where existing, non forest cover vegetation is present within a CEA, It is important to set the correct MSD in FullCAM so that the carbon stock present at project commencement is correctly quantified and removed from the crediting period abatement calculations.)

When the HIR carbon project commences, the management plan is put in place to target, reduce and manage suppression factors with the aim of achieving forest cover from this formative growth within the first 15 years of the 25 year project.

Finally, the HIR method specifically disqualifies areas of land from being counted as a CEA if they have existing forest cover. The method is so rigorous that, were the CEA to meet forest cover early - say, by the gateway check at year 6 - a question of additionality would likely arise (See below).

Criticism 3: The measurement of carbon abated and sequestered is either incorrectly captured in the CEA, or taken from the entire property on which the project is being run

Once again, the features of the HIR method have repeatedly been found to 'protect' against incorrect measurement or the inclusion of areas outside the CEA.

The method prescribes that ONLY the CEAs can be measured: only their regeneration, and therefore carbon abatement and sequestration, can contribute to the measurement, calculation and issuance of ACCUs.

Of course, trees also grow on areas of a landholder's entire property outside of the CEAs. Given these are 25 year projects, different areas of the property, and different CEAs on it, will be at different stages of growth. As they are living landscapes, both CEAs and non CEA areas of a property will be accumulating vegetation growth over time.

CEAs and the relevant vegetation growth are identified in satellite photographs, as part of the evidence collected as part of the project. So, as measurement and accounting prescribed by the HIR method only applies to relevant changes in the CEAs, not overall vegetation change on the entire property, it would be difficult to misrepresent locations outside the CEAs. Such an anomaly would be picked up in review by the ERF and the independent audits.

To this end, the concept of suppression is also important. In areas where suppression is taking place, trees do not get the chance to grow to create substantial canopy cover. However, this does not mean that trees couldn't grow in that same area if it wasn't impacted by suppression. This is precisely why evidence of suppression is required in creating a CEA. When the carbon project commences, the HIR method requires that areas where there is no suppression (i.e., those that already have forest cover) be excluded from becoming a CEA - this is another protection against using incorrect data, or data from the wider property.

Additionally, the management plan is devised and put in place to specifically target, reduce and manage suppression factors in the CEAs themselves. Measurement takes place only against the parameters of this management plan for the CEA. This is another protection.

Finally, there are other protections, in the form of conservative assumptions, built-in to the HIR method and the scheme to mitigate against risks to projects delivering incorrectly against carbon abatement forecasts. These include:

1) a buffer of 5% of actual measured change in vegetation and associated carbon abatement is withheld from final calculations in order to accommodate margins of error and risks of reversal;
2) similarly, there is a lot of abatement taking place within CEAs that cannot be counted (is excluded) under the method, including substantial carbon pools like soils; and
3) outside the CEA (within areas of the landholder's property where project activities are being implemented, but which do not meet eligibility) biomass and carbon accumulation takes place, but is also specifically excluded.

Together, these in-built checks and balances are difficult to avoid and so, have proven to work well in protecting the integrity of CEAs and the measurements of carbon abatement and sequestration taken from them.

Criticism 4: HIR results that are attributed to additionality are actually a result of the impacts of rainfall and climate

The concept of additionality is a heavily interrogated aspect of the HIR method, both from the perspective of evidence the CER requires submitted to it, and in terms of research that has been conducted to establish its efficacy.

There is no argument that vegetation responds to rainfall and other climatic conditions and changes. Vegetation responds in positive or negative ways according to the type of environmental events (eg rainfall vs aridification). Rainfall is a key driver of growth. One of the objectives of an HIR project is to implement land management activities that will maximise this growth opportunity

As described above, during the ground truthing process, climate and rainfall impacts are assessed and factored into the initial stratification, project planning, management plan and forecasting for the areas of land on which an HIR project is carried out.

In their 2021 report to the CER, *'Human induced regeneration: A spatiotemporal study'*, Dr Stephen Beare and Professor Ray Chambers found strong statistical evidence that HIR projects resulted in increases in regeneration of vegetation in NSW and QLD, independent of the impact of rainfall. In other words, they found HIR projects provide carbon sequestration that was additional to that which would have been achieved without human intervention.

The report was peer reviewed by Professor Christopher Triggs, who said "we can have confidence in the robustness of the conclusions of the analysis in this report".

GreenCollar acknowledges that work in this area is by no means complete or definitive and has been developing research methods of its own to further test these conclusions and to accumulate data and evidence in this regard.