Gateway Regeneration Checks for Human Induced Regeneration projects

ANUE Project #1-1035 (Phase 5)

C.L. Brack. Friday, 12 June 2026

Summary

This is my sixth independent review (2023 – 2026) of the Clean Energy Regulator's (CER) processes for verifying progress in Human Induced Regeneration (HIR) projects. This review adds another 10 projects that have formally reported and passed their relevant threshold audits. To date, I have evaluated 95 projects, which includes field data from almost 500 transects measured by independent, professional ecologists or foresters. The data, collected on privately managed land, is confidential but has been independently audited for quality and reliability.

This review continues the process of reviewing the data provided to the CER by the proponents or their agents to meet HIR Gateway checks, analysing field data / observations collected during s215 audits and examining the conclusions made by CER about project progress. My report of July 2025[1] detailed the HIR review process, while the report of December 2025[2] described the changes / more enhanced data collection methods now being used by HIR proponents or their agents. As in previous reports, this report compares project proponent supplied data, national scale data that is publicly available over the HIR areas and data collected by independent auditors (see Appendix 1).

My findings in this report support previous conclusions that the CER processes, supported by the independent s215 audits and increasingly accurate data provided by proponents, provide confidence that reported HIR projects are being managed in line with legislative and methodological requirements and that forest cover is increasing in the Carbon Estimation Areas (CEAs).

Introduction

This is the 6th report in the series starting in 2023 that independently reviews the processes of the Clean Energy Regulator (CER) as they evaluate progress in the Human Induced Regeneration (HIR) program. My December 2025 report summarised the results of 85

[1] Brack, C.L. (2025) Gateway Regeneration Checks for Human Induced Regeneration projects https://cer.gov.au/document_page/independent-review-gateway-checks-july-2025

[2] Brack, C.L. (2025) Independent review of gateway checks, December 2025. Independent review of gateway checks December 2025 | Clean Energy Regulator

projects that had reported and passed the relevant 5- or 10-yearly thresholds and conditions. This report adds another ten projects that have reported and passed their respective thresholds to the review (Figure 1).

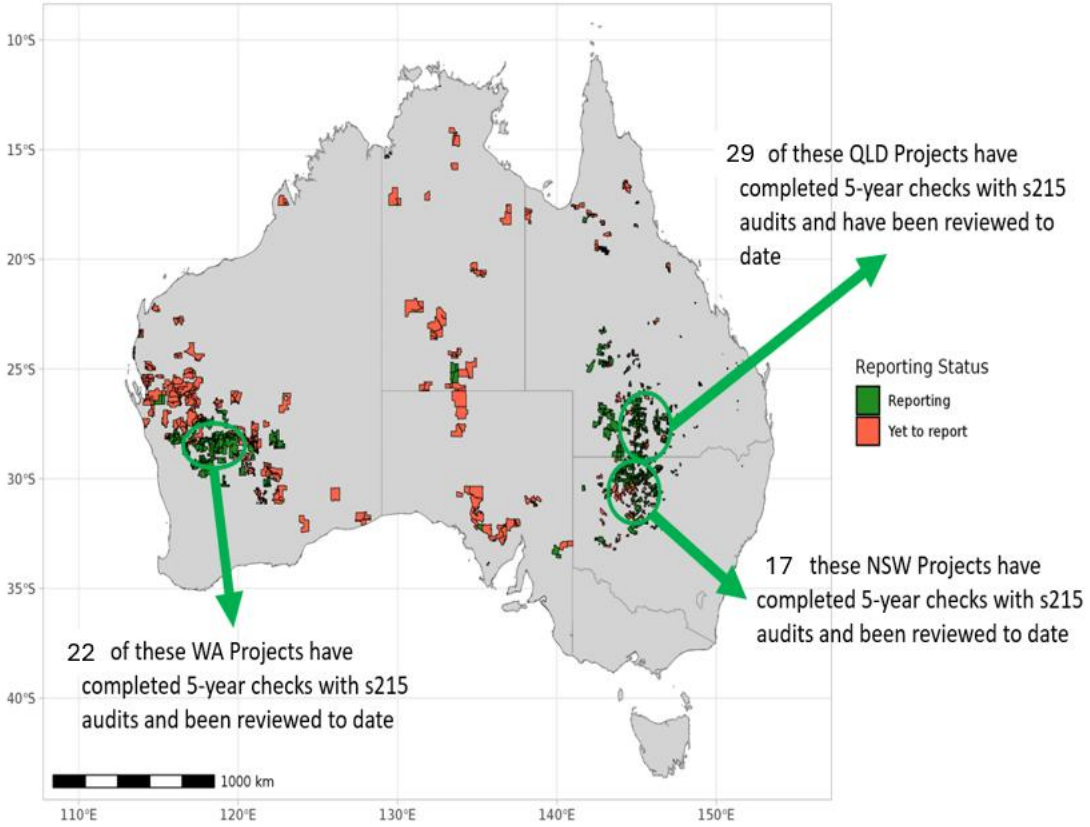

Figure 1: Map of HIR project areas with reporting status and general locations where projects have passed their 5- or 10-yearly reports, s215 audits and been reviewed. "Reporting" projects have submitted an offsets report and have received ACCUs. "Yet to report" projects have not received any ACCUs. A number of additional projects have also been reviewed but are not included as circled areas as they are too isolated to avoid being identified thus breaking confidentiality requirements

Increased scrutiny of HIR and the availability of new remote sampling and other tools resulted in improvements in the way HIR proponents and their agents collect information to verify their projects and show that they are meeting legislative and regulatory requirements. For example, the original HIR guidance allowed proponents to use national-scale maps of forest cover to confirm the absence of existing forest in the Carbon Estimation Areas (CEAs) their projects were intending to regenerate and did not require field-based measurements of regeneration to meet progress thresholds. However, there was always an expectation that proponents will "*…select techniques that best increase certainty in their situation for assessing pre-existing forest cover, the forest potential and its subsequent regeneration toward forest cover (collectively forest regeneration) and attainment of forest cover"* (Australian Government (2019), page 9[3]). Over the last few years therefore, proponents have

[3] Guidelines on stratification, evidence and records for projects under the Human-Induced Regeneration of a Permanent Even-Aged Native Forest and Native Forest from Managed Regrowth methods. 8 May 2019. https://cer.gov.au/document/guidelines-stratification-evidence-and-records-hir-and-nfmr .

relied less on national-scale forest cover data (e.g., the National Forest and Sparse-Woody – NFSW – datasets developed using Landsat-based remote sensing data at 25 – 30 m resolution) [4] and more on improved precision satellite data (e.g., Sentinel-2 at 10 m or SPOT at 1 m), field-based measurements and georeferenced photographs to demonstrate attainment of forest cover thresholds. Sometimes these high precision and more accurate data result in CEAs being re-stratified to exclude area now identified as having been forest prior to project commencement or areas that are now found to be unlikely to attain forest cover. Some agents employed by the proponents are voluntarily providing high levels of quality field data to provide added confidence in their projects. Agents have also been adopting more modern inventory techniques - including terrestrial and airborne LiDAR with AI-supported analysis - and have made formal presentations of their proposed approaches to an audience including myself and CER representatives to ensure the approaches are well understood and acceptable.

HIR projects are all on private property or privately managed leasehold land and documents and data, including field-based measurements and geospatial photographs are collected by HIR proponents or their agents as a HIR requirement. As such, these data are classified as confidential. The data and collection techniques were quality assured by independent, professional auditors. These confidential data have been made available to me to undertake this independent review. The set of data provided to support my review and the way I use it is summarised in the table from my earlier 2025 report (Appendix 1). Similar data was provided for the additional 10 projects included in this report.

More projects are submitting their 10-year reports which means they are nearing the age where the CEA should meet the final forest level thresholds. CER has advised that increased scrutiny is applied to these projects given they are close to these requirements and therefore there may be limited opportunities to overcome any shortfalls.

Results and Discussion

CER procedures to verify progress towards attainment of forest cover include checking that the CEAs exceed increasing levels of canopy cover at increasingly precise scales, or that there are sufficient plants (of appropriate species) present in the CEA to be defined as a “forest”. The current HIR Methods and Guidelines describe three alternatives of “thresholds” to be used to demonstrate acceptable progress towards forest cover:

1. Evidence that canopy cover has increased by 5% in the past 5 years; **or**
2. Evidence that canopy cover has met an age-dependent threshold:
    a. Canopy cover of at least 7.5% in each 100 ha cell at age 5;
    b. Canopy cover of at least 10% in each 10 ha cell at age 10;

[4] Australian Government (2019) National Inventory Report 2017: Volume 2.

c. Canopy cover of at least 20% in 90% of all 0.2 ha cells at its Forest Cover Attainment Date (age 15 – 20); **or**

3. Evidence that there are sufficient numbers of trees (stocking) that have the potential to reach 2 m and 20% canopy cover at their maturity.

Areas that fail to meet the threshold conditions at the gateway checks may be "paused" to await further growth or removed from the CEA along with any accrued ACCUs.

Proponents provide maps of their CEA to CER at each gateway check and detail any reasons for any changes in stratification. These CEAs exclude non-project areas and areas that were forested or had been forested within a decade of the project starting. The proponents reviewed in this report continue to use relatively fine scale remote sensing (e.g., Sentinel-2 data[5] with 10 m resolution and Worldview-2[6] with 0.5 m resolution) compared to national-scale models (e.g., Landsat with 25 m resolution). Training data for the classification was collected with physical measurements on site, high-resolution aerial photography or LiDAR.

The accuracy of the original project stratification into CEA, forest/baseline forest or non-project, was required to be at least 85% correct and compliance at this level was confirmed by the reasonable assurance audits. Re-stratification occurring during the regeneration checks also report high levels of accuracy (often 95%) with those using modern techniques reporting the root mean square error at pixel resolution of the remotely sensed imagery. Updated proponent-developed strata are intersected with 100 or 10 ha cells and compared with the 7.5% or 10% minimum canopy cover (depending on the age-dependent threshold). If the threshold fails, proponents may exclude or pause underperforming components of the CEA.

CER repeats the process of intersecting the CEAs with 100 or 10 ha cells but then estimates the canopy cover using publicly available national-scale databases like NFSW and Persistent Green[7] (PG). For projects in Queensland, they can also use SLATS. Because NFSW only groups areas into ordinal classes, nominal canopy cover values are assigned to each class: non-woody – 2.5%; sparse-woody – 12.5%; woody – 20%. CER also uses a custom-designed program (MegaForest) to estimate canopy cover change over the preceding 5-years from publicly available databases. Given the limitations of national datasets like NFSW, CER could also examine areas using other available data sources such as the Woody Cover Fraction[8] (WCF) model. Areas identified that appear to be at risk of failure or where proponent maps

[5] https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-2

[6] https://earth.esa.int/eogateway/missions/worldview-2

[7] Gill, T., Johansen, K., Scarth, P., Armston, J., Trevithick, R., Flood, N. (2015). Persistent Green Vegetation Fraction. In A. Held, S. Phinn, M. Soto-Berelov, & S. Jones (Eds.), AusCover Good Practice Guidelines: A technical handbook supporting calibration and validation activities of remotely sensed data product (pp. 134-154). Version 1.1. TERN AusCover, ISBN 978-0-646-94137-0.

[8] Liao, Z., VanDijk, A.I.J.M., He, B., Larraondo, P.R and Scarth, P.F. (2020) Woody vegetation cover, height and biomass at 25-m resolution derived from multiple site, airborne and satellite observations. Int J Appl Earth Obs Geoinformation 93: 102209.

appear significantly different to nation-scale information may be examined using a time-series of ESRI World Imagery (Wayback[9]), which can have a resolution as fine as 30 cm, to see if regeneration or canopy growth since project commencement appears to have been likely. Proponents are required to provide further evidence of progress if the above processes suggest the classification as a legitimate CEA is incorrect or if there is a high likelihood of failure to reach forest-level thresholds within the allowable time. Often, this additional evidence includes georeferenced photographs of the areas in doubt that show the number of regenerating stems relative to the number required to exceed 20% canopy cover. From 2023, enhanced s215 audits could require additional field-based data collected by independent auditors reporting directly to CER if the CER review processes suggest a risk of failure and the added evidence supplied by the proponents was not considered sufficient. These enhanced s215 data have been supplied to support my reviews since 2024.

Substantive communication between agents/proponents and CER occasionally results after the CER reviews and any s215 audit reports. These communications may lead to restratification or the provision of further evidence that reduces the perceived risk that an area may fail to reach forest cover thresholds in time. For example, one project was within a few years of the forest attainment date (i.e., when the canopy cover of 2 m tall trees has to be at least 20% in 90% of all 0.2 ha cells) but CER were not sure it could reach that threshold. The agents subsequently provided extensive LiDAR evidence to demonstrate that 100% of the CEA would reach the canopy cover threshold if trees 1.8 – 2.0 m were included. It was considered feasible that the species of trees in the CEA could grow the remaining 0.2 m to meet the 2 m tall threshold[10] by the forest attainment date. However, the proponent was also advised of the risk / consequences to the provision of ACCUs should the growth in height not occur.

In another example, a s215 auditor reported concern about the relatively large numbers of dead material on portions of the CEA. Follow up work indicated that this dead material was from “woody weeds” that have a relatively short lifespan and were not considered by the agents to be contributing to the canopy cover of a forest at attainment date – they provided sufficient evidence to CER that the longer lived species on site were still able to meet the forest cover threshold. CER now routinely also review rainfall records (from the Bureau of Meteorology or via AEX) to allow them to consider the impact of low rainfall on drought deaths of woody weeds and interpretation of PG.

CER acknowledged that proponents / agents are voluntarily providing significantly more information to support the gateway audits than the minimum requirements. Example comments from CER project reviews include:

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[9] https://livingatlas.arcgis.com/wayback/

[10] Note the Australian definition of forest includes the requirement that the woody vegetation must reach “about 2 m in height” and “about 20% canopy cover” but the HIR thresholds to do include “about” in the specifications.

- *"As with other [of this agent's] gateway checks a high level of field work has been provided";*
- *"High confidence in the [agent] gateway check process, which has been supported by previous expanded audits. High number of field data (400+ photos) submitted in support of the process";*
- *"High amount of drone LIDAR footage and field work has been undertaken to support the gateway check*" In addition, more than 200 geotagged photographs;
- After a request for further information, CER commented that "*This RFI response provides clarification on all items addressed and increases understanding of the regeneration check procedure. As a result of this RFI, processes from [the agent] have improved and the Regulator's understanding of complex and efficient remote sensing procedures has improved*"

As found in previous reports, there was no consistency in the national scale datasets of canopy cover and progress towards forest attainment for the CEAs identified by the proponents as meeting the relevant thresholds/scales. None of the projects reviewed for this report had all of the 100 ha (10 ha) cells meeting the 7.5% (10%) canopy cover threshold under PG and NFSW despite proponent/agent maps identifying them as meeting the year-5 (year-10) requirements. However, sometimes PG would "fail" the majority of cells in a CEA while NFSW would pass them, while in other projects the reverse was true. This inconsistency is not unexpected as earlier reports concluded that the various national scale models were imprecise, often failed to agree and had varying biases although all of them significantly underestimated canopy cover of sparse-woody areas compared to on ground measurements.

Given the inaccuracies in the national scale models, CER relies more on higher precision imagery or expanded field observations collected during s215 audits when reviewing CEAs. CER identify Points of Interest (*PoI*) to help confirm the accuracy of the proponents' CEA strata or otherwise focus on areas where the national scale suggests risk of failure to attain forest cover. For the 10 projects in this report, a total of 65 sites selected by CER for verification by independent, professional foresters or ecologists undertaking the s215 audits returned quantitative measurements. Further sites were selected, but the auditors only provided qualitative judgements about the accuracy of the CEA mapping. In addition to measuring the canopy cover along transects (usually dividing woody canopy into above or below 2 m height), the auditors compared the site with the proponent's mapping of canopy cover, commented on how representative the site appears to be of the 100 / 10 ha cell and offered expert judgements on whether the numbers and species of regeneration on site provide confidence that forest cover could be attained (see **Error! Reference source not found.** from Brack 2025a for examples).

If s215 audits identify areas that may not meet CEA criteria, proponents will need to exclude those areas or "pause" their modelled growth until regeneration is sufficient. All the projects

in this review restratified their CEA before the gateway checks, during discussions with CER or after the s215 audits to exclude areas that improved data suggested was not eligible or where regeneration appeared insufficient. Over these 10 projects, re-stratification reduced the CEA area by 1% to 12% with a mean reduction of 5%. These reductions are similar to those in the 85 projects reviewed previously (half of those projects had less than a 5% reduction in CEA area) and well within the expected range.

The 10 projects reviewed in this report all passed their gateway checks based on the above checks (after incorporating any required reduction in CEA) and had an average estimated 1.2 tC $CO_{2\text{-}e}$ net abatement yr^{-1} ha^{-1} of CEA for the most recent period available (slightly less than the average 1.4 tC $CO_{2\text{-}e}$ estimated for the 85 projects reviewed previously). This net abatement is discounted before credited for ACCUs to account for the permanency period and a *risk of reversal buffer*. No credits are issued if the net abatement is negative for a period due to reductions in CEA or pauses in growth and will not be resumed until further growth has occurred to return the overall abatement to positive values.

National-scale comparisons

My earlier report compared the field observations collected by independent auditors at PoI's and other representative points with national scale models/maps of canopy (i.e., PG, NFSW and WCF). Given the use of these national scale models/maps by CER to identify potential problem areas / inaccuracies in proponent mapping, and by others to critique the HIR program, this report continued that analysis.

The conclusions from previous reports were that the national scale models all significantly underestimated the canopy cover of CEAs in the lower canopy classes – i.e., NFSW classes non-woody and sparse-woody. The bias in the national scale models reduced as the canopy cover increased to over about 30% or well into the woody/forest class of NFSW. These biases and the lack of a significant difference between the canopy cover in the sparse-woody class and either non-woody or woody/forest meant that the national scale models are not appropriate for making conclusions about canopy cover or its increase in HIR projects.

The additional field-based measurements made available for this review do not significantly change previous conclusions that the national scale models all significantly underestimate canopy cover in the lower canopy cover classes. The bias tends to become less significant as canopy cover increases well above the 20% threshold and into 30%+ "forest levels".

NFSW continues to demonstrate a poor accuracy rate over project areas when classifying non-woody (42%, 30% and 18% correct for Qld, NSW and WA respectively) or sparse-woody (41%, 23% and 52% correct for Qld, NSW and WA respectively) (Figure 2). For both Qld and NSW, the mean canopy cover in sparse-woody is not significantly different to either non-woody or woody ($p=0.05$), again demonstrating NFSW would not be useful for identifying movement between classes. Non-woody and sparse-woody measurement means were well

above their nominal canopy cover expectations with the mean for non-woody more like the expected value for sparse-woody and sparse-woody beyond the threshold for woody.

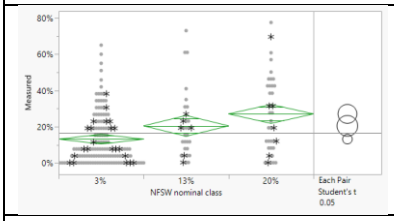
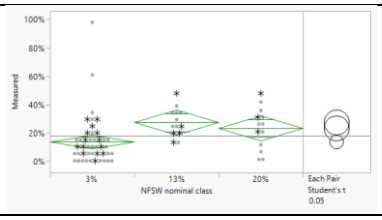
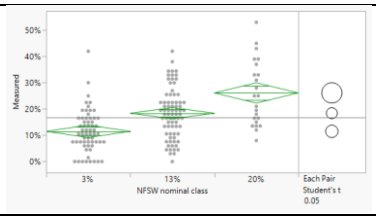
Queensland	New South Wales	Western Australia
		
Classification accuracy: Non-woody: 42% Sparse-woody: 41% Woody/Forest: 57%	Classification accuracy: Non-woody: 30% Sparse-woody: 23% Woody/Forest: 70%	Classification accuracy: Non-woody: 18% Sparse-woody: 52% Woody/Forest: 61%
Canopy Cover (class mean): Non-woody: 13% Sparse-woody: 21% Woody/Forest: 27%	Canopy Cover (class mean): Non-woody: 14% Sparse-woody: 28% Woody/Forest: 23%	Canopy Cover (class mean): Non-woody: 12% Sparse-woody: 18% Woody/Forest: 26%

Figure 2: ANOVA for field measurements of canopy copy against NFSW classes (Version 8.0 – 2023,2024, 2025 Releases). The diamonds represent ANOVA means and error ranges. Overlapping circles denote no significant difference. Classification accuracy = number of samples within correct canopy cover range / total number classified. * points indicate new observations.

Similarly, PG significantly ($p<0.05$) and consistently underestimates the measured canopy cover in Qld by about 7% (slope not significantly different to 1, but intercept significantly greater than 0). WA has a weak relationship between PG and measured canopy cover (r^2 = 0.02) with almost all measurements of canopy cover well above PG. The NSW relationship is not significantly different to a 1:1 relationship (r^2 = 0.16, RMSE = 15%) (Figure 3).

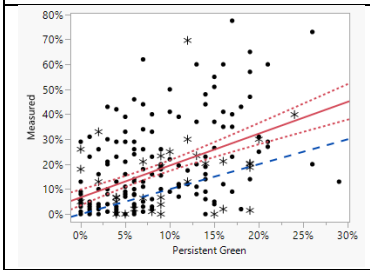
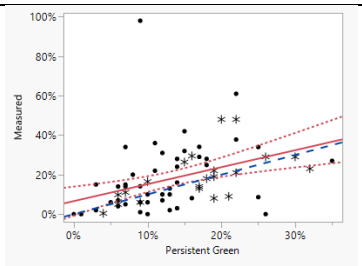
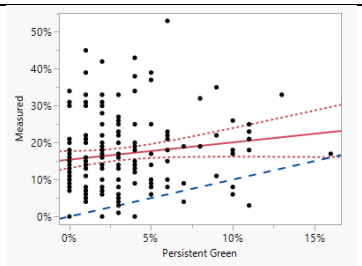
Queensland	New South Wales	Western Australia
		
R^2 = 0.24 RMSE = 0.15 N = 208 p < 0.001	R^2 = 0.16 RMSE = 0.15 N = 70 p < 0.001	R^2 = 0.02 RMSE = 0.10 N = 160 p = 0.07

*Figure 3: Plot of Persistent Green estimates (Landsat, JRSRP Algorithm Version 3.0, Australia Coverage) against in situ measurements of canopy cover. Dashed line is 1:1. Solid line represents the line of best fit and dotted lines are the prediction intervals for best fit (p<0.05). * points indicate new observations.*

Relationships based on WCF (i.e., CPC derived from AEX) are significant for all States ($p<0.001$) but significantly different to a 1:1 relationship and underestimate canopy cover, especially in the lower cover areas (the intercepts are all significantly greater than 0 and

reach as high as 16% for WA). These biases are impacted by a disproportionate number of observations where WCF predicts 0 – 1% but the measured canopy is, on average, closer to 10 - 20% (Figure 4). Filtering out the points where AEX CPC is less than 1%, improves the significance of each fit but the relationships are all still significantly different to 1:1 with an intercept significantly greater than 0%.

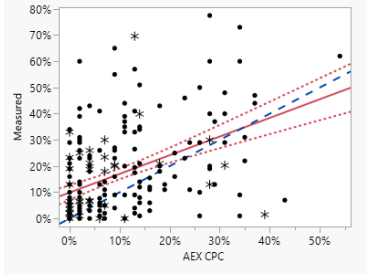
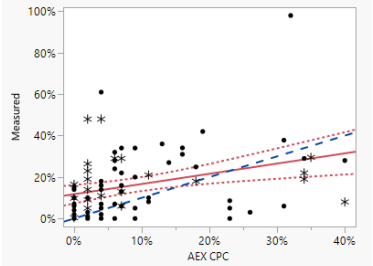
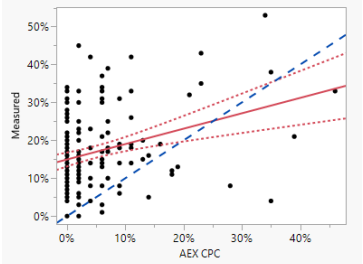
Queensland	New South Wales	Western Australia
		
R^2 = 0.21 RMSE = 0.15 N = 208 p < 0.001	R^2 = 0.11 RMSE = 0.15 N = 82 p = 0.002	R^2 = 0.09 RMSE = 0.10 N = 160 p < 0.001

*Figure 4: Plot of Canopy Cover estimates (transformed from WCF estimated by Australia's Environment Explorer) against in situ measurements of canopy cover. Dashed line is 1:1. Solid line represents the line of best fit and dotted lines are the prediction intervals for best fit (p<0.05). * points indicate new observations.*

These updated relationships confirm the previous conclusions that:

a) NFSW is unreliable for monitoring canopy cover or change in the CEAs. It is noteworthy that the National Forest Inventory[11] proposes to update the modelling of NFSW to replace LandSat remotely sensing data with Sentinel-2 data (matching minimum resolution used by most HIR proponents), which should improve NFSW accuracy in future;

b) Both PG and WCF-based estimates significantly underestimate canopy cover, especially when cover is less than about 30%, although the positive linear relationship suggests that an increase in PG or WCF is correlated to an increase in canopy cover.

c) CER reviews should continue to use the above national scale sources to identify possible high-risk areas, but cannot rely on them to make definitive conclusions about proponent mapping accuracy or failure of areas to progress towards attaining forest cover. Higher precision remote sensing, LiDAR and/or field measurements are needed to verify the precision of the proponent's mapping in these high-risk areas to improve confidence in CEA success.

[11] Australian Government, Department of Climate Change, Energy, the Environment and Water (2023) National Inventory Report 2023. Volume 1, p 280

Conclusions

The additional data provided for this review do not change any of the discussions made previously.

After reviewing almost 100 projects that have reported and passed their 5- or 10-yearly check, including about 600 independently measured field transects, I conclude that:

- The independent audit reports, CER reviews and s215 audits provide strong assurance that projects are being managed as per the HIR requirements;
- Appropriate methods have been used by the proponents or their agents in classifying their CEA and confirming regeneration canopy cover is meeting threshold levels;
- Minor areas of potential regeneration issues identified by ecologists/foresters during the expanded s215 audits appear to be within the guidelines for stratification accuracy but are required to be reviewed and potentially removed before the next reporting period;
- The CER reviews continue to appropriately utilise multiple sources of data, including national-scale models, to check whether regeneration thresholds at relevant scales are being met;
- National-scale models often result in conflicting conclusions and tend to significantly underestimate the canopy cover in CEAs;
- Substantive discrepancies between the models and the high-resolution data being used by proponents in stratification led to further information being required by CER before the regeneration check is accepted. Many proponents are providing this additional data as a routine part of their regeneration checks and have formal methods to establish POPs, TOPs and FOPs.
- On average, stratification by proponents or their agents into CEA that are regenerating is reliable with an acceptable accuracy rate and accords with good practice.

Appendix 1: List of data / datasets provided for Brack 2023, 2024, 2025a,b, 2026 reviews (extracted from Brack (2025a))

Data, documents	**Description**	**Source**	**Use in Brack reviews**
Reasonable Assurance Audits of projects Note: Audits are peer reviewed by a third party to "*support the audit approach, findings and conclusions of the Audit Team*"	Auditors review documentation, data and processes to confirm the proponent met requirements of the HIR methodology; reported appropriately; and that the project has been implemented in accordance with the relevant methodology determinations and requirements of the CFI Act and CFI Rule, and associated guidelines (including the CFI Mapping Guidelines and HIR and NFRM Stratification Guidelines.	Independent greenhouse and energy auditors	Audit reports for each project were reviewed and any "issue/risk" identified by the auditors noted and impacts considered. Areas considered by Auditors were extensive and ranged from legal eligibility; stratification; modelling and calculations; documentation; and controls to prevent fraud. No project passed its 5-year review if there were unaddressed medium- or high risk- issues
Documentary evidence of management activities	Various documents, including invoices, sales dockets and other material to demonstrate project proponents met their requirements to fence, trap or otherwise remove feral animals; reduce/manage grazing/browsing to demonstrably safe level; etc.	Proponents (also sighted by auditors)	Examples sighted to confirm evidence that appropriate management action existed
Maps of stratification into baseline/pre-existing forest; non-project; and CEAs	Physical and/or digital maps along with details of map construction: satellite resolution (usually 1.5 – 10 m), supervised/unsupervised techniques, training sites and *in situ* data collection	Proponent / Agents	Physical maps sighted (or GIS layers accessed) to compare/contrast with other sources of evidence, especially AEX. Test accuracy with s215 field data.
Estimation of proponent's map accuracy,	Confusion / error matrix or other description of map accuracy. Description of accuracy analysis.	Proponent / Agents	Confirm accuracy evaluation and that accuracy exceeds acceptable threshold (85%). Noted any "justification" if poorer levels of accuracy were observed. Identified potential areas for further analysis

Maps of CEA strata with canopy cover (CC%)	Maps generated by agent's stratification and modelling. Aggregated into 100 ha cells for comparison with minimum threshold values	Proponent / Agents	Check to confirm CEAs meet 5-year thresholds, i.e. at least 7.5% canopy cover at 100 ha scale; or 5% increase in canopy cover. Assess if any restratification occurred to exclude portions of CEA that were insufficiently regenerating and failing to meet thresholds
Photographs and field measurements of CEA	Georeferenced photographs, measurements and descriptions of Permanent Observation Points (POPs) or Temporary Observation Points (TOPs) as volunteered	Proponent / Agents	Samples sighted to provide "overall" feeling for the projects [Note TOPs not included in statistical analyses to avoid perception/potential for biased sample point selection]
Maps of canopy cover estimates derived from NFSW[12] Various versions and release dates to match the reporting period	CPC estimated for 100 ha cells using conservative estimates of average CPC in each NFSW strata.	NFSW / National Inventory through DCCEEW, and accessed via data.gov.au	Compare/contrast canopy cover estimates with the Agent produced maps. Note patterns; any substantive difference in maps; and areas where 100 ha cell fail to meet minimum thresholds.
Maps derived from Persistent Green[13] (PG), (Auscover) Various versions and release dates to match the reporting period	Persist vegetation coverage estimates in 100 ha cells.	TERN, physical maps provided by CER	As for NFSW, but noting PG theoretically includes estimates of vegetation cover regardless of vegetation height

[12] Australian Government (2019) National Inventory Report 2017: Volume 2 [page 149]

[13] Gill, T., Johansen, K., Scarth, P., Armston, J., Trevithick, R., Flood, N. (2015). Persistent Green Vegetation Fraction. In A. Held, S. Phinn, M. Soto-Berelov, & S. Jones (Eds.), AusCover Good Practice Guidelines: A technical handbook supporting calibration and validation activities of remotely sensed data product (pp. 134-154). Version 1.1. TERN AusCover, ISBN 978-0-646-94137-0.

Mega Forest Cover Tool	A purpose-built analytical spreadsheet tool tracking change in vegetation cover within CEAs and project area using multiple data sources including each version of the maps that inform the National inventory from 2015 to present	CER, using National inventory data accessed via data.gov.au	Check whether project meets the 5% increase in canopy cover threshold
Documents and emails on CER comparisons of canopy maps	Analysis and comment on any substantive differences between NFSW, Persistent Green and Proponent values at 100 ha scale, and requests for further evidence as required	CER	Check whether CER analysis agree with mine and what additional evidence would be needed to provide assurance
Historic / archive remote sensing images	Sequences of images for sample areas where there is concern that thresholds not being met	Wayback imagery via CER	Samples checked to see if I agree with CER conclusions about the temporal images indicating increases in cover
Additional evidence provided in response to CER identification of “points of interest”	Georeferenced photographs and/or in-situ measurements of canopy cover / number of trees capable of achieving 2+ m height for areas, including those selected by CER for follow-up	Proponent / Agents	Used in statistical analyses given CER assign PoI locations and proponents/agents have restricted potential to bias sampling.
Australian Environment Explorer (AEX) integrated data visualization and modelling via TERN) Estimates of current/historic weather; soil condition; fire; social/management; environmental condition and	20 – 30 points / project (600 points overall) systematically examined using remotely sensed imagery in 2023 250+ points of interest across about 50 projects in 2024, 2025.	https://ausenv.tern.org.au/aex/ ANU Water and Landscape Dynamics	WCF used in accuracy estimates of agent estimates (2023) and comparisons with all other canopy cover estimates available to CER in 2024, 2025 AEX also provides comprehensive contextual information to improve interpretation of estimates

Woody Cover Fraction[3] (WCF)			
TreeChange	Estimates of WCF, vegetation height and biomass over user nominated areas	http://www.wenfo.org/tree/ ANU Water and Landscape Dynamics	Comprehensive contextual information about vegetation dynamics surrounding project areas. Provides confidence forest cover can be achieved if vegetation in neighbouring regions has reached minimum heights and cover
Offsets reports	Details of modelling, any changes in stratification, offset calculations and modelling	Proponent / Agents	Data to support statistical analyses
s215 audits	Reports and raw data including georeferenced photographs, in situ measurements of tree canopy, regeneration and comments on likelihood of achieving forests status at Points of Interest (identified by CER) and Temporary or Permanent Sample Points selected by auditors	Independent and registered audit teams (including ecologists/foresters with relevant expertise) 2024, 2025	Used in statistical analyses and independent accuracy assessment of agent stratification given CER assign PoI locations and proponents/agents have restricted potential to bias sampling. Review of auditors' expert assessments on the accuracy of proponent's mapping and whether CEAs are meeting regulation conditions

[3] Liao, Z., VanDijk, A.I.J.M., He, B., Larraondo, P.R and Scarth, P.F. (2020) Woody vegetation cover, height and biomass at 25-m resolution derived from multiple site, airborne and satellite observations. Int J Appl Earth Obs Geoinformation 93: 102209