Biodiversity crediting baseline validation:

Reporting & recommendations following initial pilot assessments:

Rottal – Fordie Estate - Ericstaine

February 2025 (Version 2.0)

This project is supported by The Facility for Investment Ready Nature in Scotland (FIRNS). Delivered by NatureScot in collaboration with The Scottish Government and in partnership with the National Lottery Heritage Fund.

Table of Contents

1. Validation scope

Soil Association Certification undertook site visits for pilot validations at (1) Rottal Estate & (2) Fordie Estate between 7-8 November 2024, and at (3) Ericstaine on 22 January 2025 against guidance provided by IUCN (reference: *IUCN Monitoring Guidance*). This guidance outlines that,

> *The ideal outcome of these validations is not a perfectly executed validation, per se, but to receive feedback from the validators about what needs to be considered further and fed into the process of framework development*

Accordingly, SA Certification has included content and assessment criteria within a pilot draft validation checklist (see: 7., 8., & 9.) to supplement this guidance to (i) support and test validation approach, and to (ii) best inform biodiversity code criteria development.

1.1 Scope limitations

Validation scope is limited to an assessment of the provided baseline metrics only. It should be noted that at the time of the Fordie and Rottal validations there was no draft scheme specific qualifying criteria in place against which to pilot the validation approach. Scheme specific draft criteria was only finalised by IUCN in January 2025 and so was not available in advance to enable the final pilot site to provide validation data to assess against. SA Certification recommend that in advance of formal launch of biodiversity crediting as part of either Code (PC/WCC) a further validation should occur against the draft criteria as informed via the submission of recently developed key document templates (e.g. project design document, management plan, monitoring plan). In addition, as these pilot validations are against baseline datasets only, consideration will need to be given to validation approach to projected uplift as part of the application of the Wallacea Methodology. There is also still a need to test the use of an independent organization that approves the biostatistical sampling method and Wallacea outputs.

It should also be noted that baseline datasets received by SA Certification were not complete. Notably, condition assessment of the Rottal sites and related mapping were not provided in advance of the site assessment. No condition assessment was undertaken or provided for Ericstaine. In addition, species metric baseline dataset outputs for Rottal and Ercstaine were not made available until post-site visits.

2. Reporting overview

This report is broken down into 2 core sections:

(i) Overarching feedback specific to supporting code development (1-6)

(ii) Site level reporting against IUCN guidance and SA Certification supplementary criteria (6)

3. Validation approach – context

SA Certification made use of technical experts to support the validation approach:

- **Eamonn Flood** (MCIEEM) specialises in upland habitat ecology, is an existing Peatland Code VVTL, and a former Senior Ecologist for National Trust for Scotland (NTS)
- **Andy Grundy** (Head of Climate & Landscape) is a chartered Forester (MICFor) with a broad portfolio of sustainable forestry management experience.

At site, observations were made by visiting a sample of exacting geo-referenced locations to assess the accuracy of baseline metrics and monitoring methodologies employed. It is acknowledged that the validation assessment occurred at a different time of year to the baseline surveys and so it is not possible or practicable to repeat the surveys. Instead, technical experts were asked to consider, where possible, that based on habitat type and condition and visible vegetation, that baseline metrics could fairly be represented at the site. Annotated mapping was used to document sampling locations along with photography and observations from technical experts relating to habitat type, condition, observable species, and locations of species monitoring (image 1.)

For Ridge Rottal and Ericstaine use was made of the Mozaic Earth app, which provided photographic evidence of higher plants surveyed as part of baseline assessments.

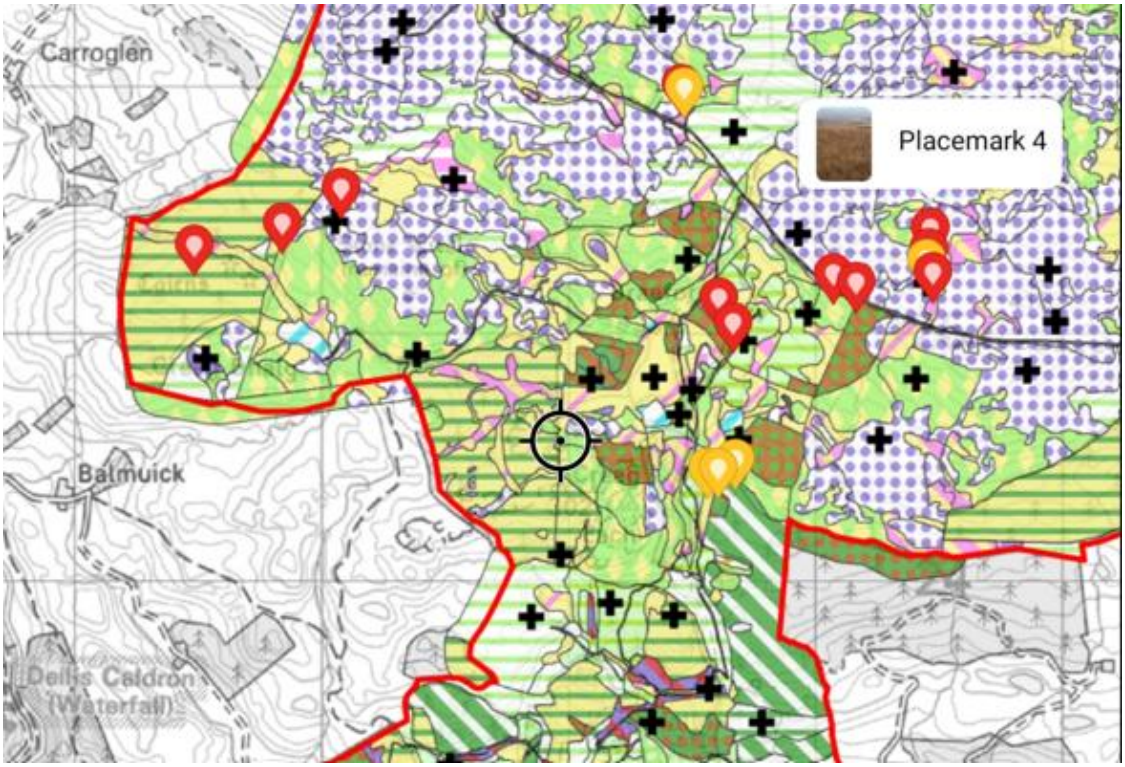


Image 1. Validation sampling locations at Fordie Estate

4. Structural metric

4.1. Fordie Estate

Fordie is the only pilot site for which structural baseline datasets were received for validation. Accordingly, observations in this report are limited to this site and the metric applied (UK Habs).

The validation of datasets relating to structural baseline (habitat type and condition) are accommodated by clear surveying and mapping to UK Habs. Consideration should be given to whether UK Habs should be the default mandated surveying/mapping method used within the code for woodland and mosaic habitats. This approach ensures consistency in application and assessment of baselining against this metric. It is also the language used as part of the compliance market for BNG and the Defra metric.

Whilst on-site at Fordie, we did identify some inaccuracies in mapping (image 2.), likely caused by the incorrect filling of a polygon in GIS.

Image 2. Inaccuracies in habitat mapping

This area of the site had been mapped as *h1b5 - Dry Heaths, Upland (H4030)*, which should instead have been mapped as a continuation of the adjacently mapped *f2c - Upland Flushes, Fens and Swamps*. This is also apparent from ariel photography.

Similarly, an area in the south-west of the site had been denoted as *g1b5 - Montane Acid Grasslands,* that is better defined as *g1c – Bracken*. However, it should here be noted that a deer fence had been erected following the last survey that may have led to an increase in bracken in this area of the site between surveys:

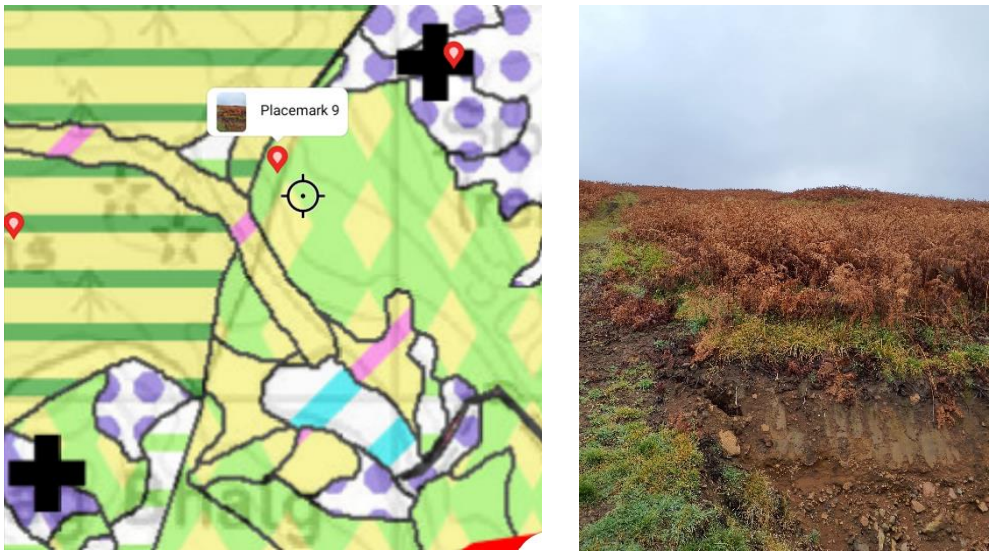


Image 3: Differences in habitat type

4.2 Evidencing Competency

The reporting provided for Fordie included competency information for ecologists undertaking the site survey:

> **2.5 Evidence of Technical Competence**
>
> The field survey was carried out by Kirstie Hazelwood. The habitat report was written by Kirstie Hazelwood, Ida Bailey and Bob Edmonds.
>
> Kirstie Hazelwood, MSc, PhD, ACIEEM: Kirstie is a senior ecologist with nine years experience in ecology, within consultancy, NGOs and research. She is an associate member of CIEEM and holds a PhD in tree community ecology. She has worked on over 30 upland and lowland sites in Scotland including numerous large development sites. She has trained in the recently developed UKHab methods and has carried out extensive NVC and habitat assessment work. She has a particular interest in plant communities, habitat quality monitoring and habitat restoration.
>
> Ida Bailey, BSc (Hons), PhD, ACIEEM, CERPIT: Ida is a Natural Capital and Naure Lead – Europe for SLR. She has over 17 years' experience in ecology in both consultancy and research. She is and is a qualified project manager (PRINCE2 Practitioner), an associate member of CIEEM and a Certified Ecological Restoration Practitioner In Training (CERPIT) the Society for Ecological Restoration. She has a particular interest in projects involving habitat restoration and natural capital. Within the past six years Ida has managed the ecological aspects of over 50 projects including: rewilding, afforestation, carbon sequestration, natural capital reporting, onshore wind, grid, forestry, minerals/ mining, floating solar, conservation, waste/landfill, tourism, road, residential developments and hydroelectric projects. Her experience of natural capital projects includes consideration of biodiversity credit creation for both voluntary and compliance markets.
>
> Bob Edmonds BSc MCIEEM CEnv: Bob is a Technical Director and Ecology and Biodiversity Technical Discipline Manager at SLR Consulting Ltd. Bob specialises in ecological impact assessment, habitat management planning, biodiversity net gain (BNG) and protected fauna survey and mitigation. Bob has spent much of the last 10 years leading the development of guidance and good practice in the area of biodiversity net gain and ecological impact assessment. He was a contributing author to CIRIA-CIEEM-IEMA Principles for BNG published in 2016 and a committee member on British Standard BS8683 – Biodiversity Net Gain, where he is representing the Chartered Institute of Ecology and Environmental Management (CIEEM). Bob has been a member of the Professional Standards Committee of CIEEM since 2014 and is currently co-Chair. Bob had an key role in preparing CIEEM's 2019 EcIA Guidelines, 2017 Guidelines for Preliminary Ecological Appraisal and 2021 Reporting Templates for Biodiversity Net Gain. Bob is a Director of UKHab Ltd, the not-for-profit organisation

Although it is appreciated that not all project developers will have access to this level of technical expertise, some level of competency assessment should be formally mandated by the Code to provide framework of assurance in survey accuracy.

4.3 Structural metric – topline validation outputs:

- The need for consistency is key. We recommend the need for a defined uniform classification system for assessment of habitat type and condition for woodlands and mosaic habitats (e.g. UK Habs). This should make use of standardised methods and record keeping templates for submission as part of validation.

- For peatland habitats, there is still a need to test validation approach to the Lindsay condition assessment
- Consideration should be given as to whether an on-site validation is required against baseline. This is not currently required as part of PC or WCC (although the PC Code does have a restoration validation within 12 months) and so would increase costs of the project further
- Evidence of surveyor competency to a defined threshold (e.g. MCIEEM) should be mandated as part of the code criteria (this could be evidenced by PD as part of management plan)
- Providing competency is determined, ariel imagery may then be used as a tool in validation to assess accuracy of habitat type and delineation between boundaries, AND;
- The use of georeferenced photography must be taken to support definition of baseline habitat type and condition
- There is a need for a code specific field guide to support a defined methodological approach to baselining and monitoring that is consistent across all project sites (key for consistency in approach)
- The management plan should be amended to clearly state survey methodological approach. This must align with field protocol and will be assessed as part of the validation process
- For onsite validation/verification, sampling frequency and plan (percentage survey points assessed) to be determined by VVB based on risk assessment and strategic analysis in line with ISO 14064

5. Species metrics

5.1 Inverts

It was not possible to find readily identifiable invert sampling locations at any of the sites, including evidence of trenches for pitfall traps having been dug. At Rottal, one sampling site did include what may be interpreted as evidence of a pit trap, but it was not directly located in alignment with the reference coordinates:

Image 4. ***Possible invert pitfall trap***

As with the structural metric, validation evidence here would better consist of *in situ* georeferenced photographs of traps when deployed and output at collection (both close-up and within broader habitat- such requirements should be defined as part of a Code specific field protocol). This should be supported by detailed methodological description as part of management and monitoring plans (as per Fordie reporting) that ensures survey approach aligns with field protocol criteria and is sufficiently detailed to enable it to be repeated at subsequent surveys.

For invert validation, assessment of competency to code defined criteria is also a key requirement. Again, the Code should mandate criteria relating to methods used on site – e.g. what level counts are made (species, group, functional groups etc.)

It was also noted that consideration should be given to how invert species selected for baselining may be absent or undergo a significant reduction in abundance in subsequent monitoring due to a given habitat transition (e.g. grassland to woodland under the WCC)

indicating a reduction in biodiversity uplift. This will need to be considered by project developers as part of determination of metric appropriateness during baselining over duration of projected habitat changes.

Consideration is also required relating to reporting of monitoring outputs for species metrics. The output datasets for Fordie act as a good example of 'what good looks like'. SA Certification consider that the criteria and field protocol for biodiversity crediting should include mandatory reporting fields by different species metric. For instance, invert reporting included the following fields: Order, Family, Taxon, quadrat location, x/y coordinates, habitat type (UK Habs format), date, survey method, surveyor name, conservation status/value. Such fields should be a minimum as part of baseline and monitoring reporting output. It is crucial that these fields are consistent from baseline and across all subsequent monitoring and consideration should be given to the drafting and provision of standardised templates for project developers.

5.1.1 Metabarcoding

Fordie Estate and Ridge Rottal have both made used of metabarcoding as part of baselining species identified on site.

Results received evidenced anomalies/discrepancies with visual identification of species. For instance, at Rottal, nine taxonomic groups (Hymenoptera, Orthoptera, Odonata, Mecoptera, Dermaptera, Archaeognatha, Acari, Diplopoda, and Amphipoda) were visually identified but not detected in the metabarcoding analysis (see: *Ridge Rottal Biodiversity Baseline 2024 Final Report (002*). At Ericstaine, four taxonomic groups were visually identified but not detected in the metabarcoding analysis. Both sites included Orders in the metabarcoding data for which no individuals belonging to this group were identified.

These discrepancies raise validation concerns relating to the accuracy of this method of species identification as part of monitoring strategies.

Metabarcoding analysis relies on the use of third parties. Consideration must be given to criteria relating to competency requirements when using third parties (e.g. ISO accreditation) and how the efficacy of the method/algorithm used has been sufficiently evidenced.

5.2 Birds

Bird monitoring locations were visited, but validation assessment was limited to consideration of appropriateness of location. Instead, photographs and supporting evidence which document application of method (e.g. acoustic monitoring *in situ,* mapping of survey area and transects walked) along with detailed explanation and rationale (e.g. why specific areas were identified for sampling or use of bioacoustics

monitors and why this was best approach for the site). Again, this must be standardised and sufficiently detailed to enable it to be repeated by another ecologist at a later stage with consistency.

The datasets from Fordie were clear in denoting methodological approach and whether counts are specific to resident/breeding and the rationale for this distinction:

Birds were considered to be confirmed breeding if:

- They were observed displaying or singing on more than one visit;
- Nests, eggs, and young were identified;
- Adults repeatedly alarm called;
- Distraction displays were seen; and/or
- Territorial disputes were observed.

Birds were considered to be probably or possibly (i.e. unconfirmed) breeding if:

- They were observed displaying or singing on one visit (with the exception of obvious passage migrants in spring); or
- A pair of birds was observed in suitable habitat for nesting.
- Other records were considered to be of non-breeding birds, failed breeders, birds loafing, feeding or on passage to other areas.

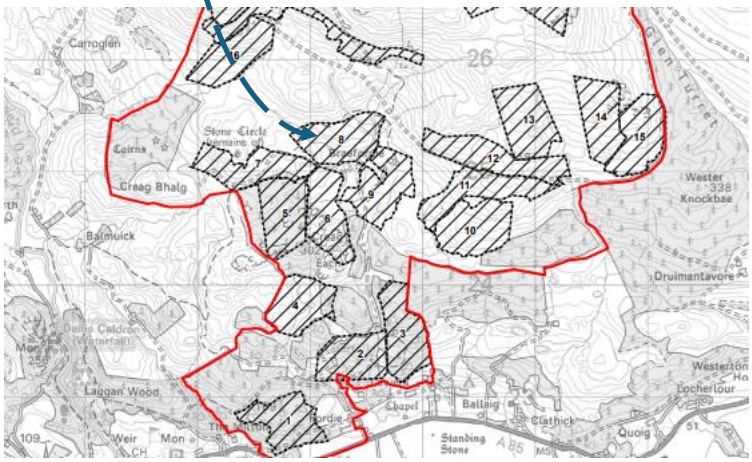
This level of detail should be included as part of the field protocol. Mapping provided evidenced approach to survey along with competency data for surveyors in the field responsible for baselining. Consideration will need to be given to requirement relating to repeat surveys and monitoring – the code should determine whether repeat surveys occur at same time of year/season.

Reporting for Ericstaine and Rottal did not provide sufficient detail relating to rationale for bioacoustics locations used.

All surveys were completed over summer months. However, consideration should also be given to overwintering birds, which may not be identified by a summer survey but that are likely to be affected as part of habitat changes attributable to restoration activity.

Importantly, output from all species related surveys should enable validators to trace between documents. Forn instance, survey plots identified on mapping for Fordie are numbered and have been referenced as part of survey outputs to enable traceability between mapping and reporting.

Context	Specie	Parcel No	Area	English Name	Scientific Name
Outsidewood	LR	Parcel 2	Retained Woodland	Lesser Redpoll	Acanthis cabaret
Withinwood	LR	Parcel 3	Retained Woodland	Lesser Redpoll	Acanthis cabaret
Outsidewood	LR	Parcel 5	Retained Woodland	Lesser Redpoll	Acanthis cabaret
Outsidewood	LR	Parcel 6	Retained Woodland	Lesser Redpoll	Acanthis cabaret
Outsidewood	LR	Parcel 8	New Woodland	Lesser Redpoll	Acanthis cabaret
Withinwood	LR	Parcel 8	New Woodland	Lesser Redpoll	Acanthis cabaret
Withinwood	SH	Parcel 1	Retained Woodland	Sparrowhawk	Accipiter nisus
Outsidewood	SW	Parcel 9	New Woodland	Sedge Warbler	Acrocephalus schoenobaenu
Outsidewood	CS	Parcel 24	Open Upland	Common Sandpiper	Actitis hypoleucos
Outsidewood	LT	Parcel 1	Retained Woodland	Long-tailed Tit	Aegithalos caudatus
Withinwood	LT	Parcel 1	Retained Woodland	Long-tailed Tit	Aegithalos caudatus
Withinwood	LT	Parcel 3	Retained Woodland	Long-tailed Tit	Aegithalos caudatus
Outsidewood	S.	Parcel 10	New Woodland	Skylark	Alauda arvensis
Outsidewood	S.	Parcel 10	New Woodland	Skylark	Alauda arvensis
Outsidewood	S.	Parcel 10	New Woodland	Skylark	Alauda arvensis



5.2.1 Bioacoustics

Rottal and Ercistaine both employed bioacoustic monitoring as part of site baseline surveys.

As with metabarcoding, criteria is required to evidence the efficiency of any third-party AI employed to identify bird calls. Similarly, competency information must be provided for any individuals responsible for assessing recording outputs.

SA Certification ecologist queried the inclusion of Rock pipit *Anthus petrosus*, which typically has a costal distribution and was considered less likely to be present in moorland habitats.

5.3 Higher plants

Higher plants are more easily assessed by visiting the locations and assessing vegetation (see 6.). However, differing time of year for survey does limit fair comparison to an extent.

Again, photography at time of survey acts to usefully inform validation. This was tested as part of *Mozaic Earth* outputs for Rottal and Ericstaine. The platform enables remote assessment of plants by species type via exacting quadrat locations and enabled SA certification to check accuracy of species identification. The app acted as a functional tool to aid assessment as part of complimentary means of validation (site visit, competency assessments). However, inherent in the design of the app is the use of non-experts in the field. SA Certification's ecologist suggested that limitation of photography is that it does not enable parting of ground to examine ground flora e.g. if you get a tall sward of graminoids this may hide species grown in the sward.

Competency would also need to be evidenced for the expert who then subsequently labels plant to species level as part of the baselining survey.

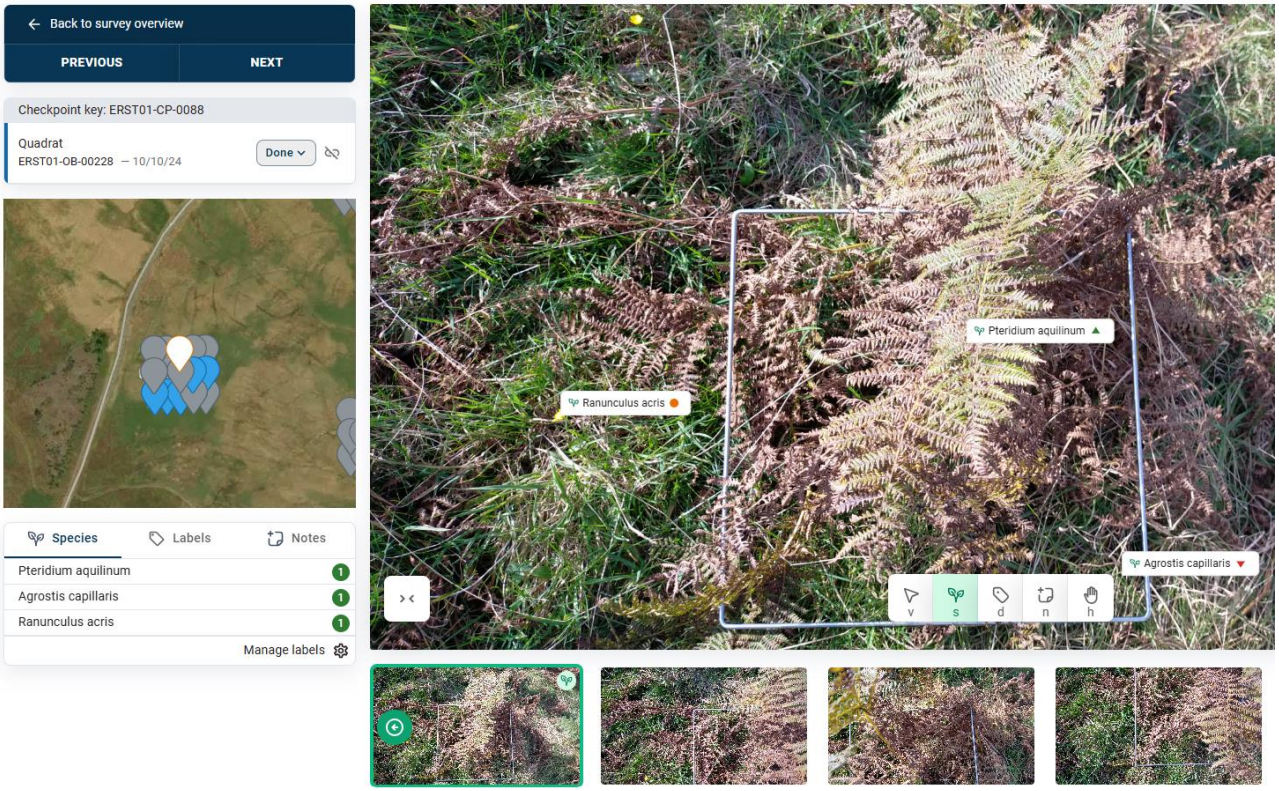


Image 5. Screenshot of Mozaic Earth species identification app for higher plants

In the most part, SA Certification agreed with species identification evidenced from labelled photography provided. However, in one instance, *Carex bigelowii* appears within the species list but could not readily be identified based on the photography provided. SA Certification's ecologist considered that this species would not typically be found in this

habitat or altitude as it is an alpine artic species – more likely present in a Montaine environment at higher altitude and not typically among the other species listed.

Where used, photographic evidence need to be standardised as informed by the required Code field protocol. For instance, at Fordie, methods employed required, '*Two photos from the southern edge of the quadrat looking north, one close up of the quadrat and one of the quadrat within the wider habitat context'*. Related reporting outputs and methodology would need to be consistent and repeatable.

Although the use of photography may enable remote validation assessment, it is of note that when at Rottal we identified that survey areas evidenced apparent burning of peatland vegetation (n.b. this would be prohibited under PC) which limited assessment of vegetation (see image 6.). This would not have been apparent without attending site.

Image 6. ***Rottal vegetation within survey plots – apparent vegetation burning***

5.4 Species metric – topline validation outputs:

- There is a need for a code specific field guide to support a defined methodological approach to baselining and monitoring that is consistent across all project sites (key for consistency in approach). The field protocol should state minimum reporting outputs and frequency of sampling etc.

- Depending on the metric, on-site validation can be limited in ability to meaningfully assess some baseline species metrics (inverts, birds). An assessment of the capacity of the habitat type and condition to support the presence, richness, and abundance of species may be undertaken to a limited extent. However, evidence of technical competency of the surveyor/ecologist and a detailed explanation of method employed acts as a useful means of validation.

- Mechanisms are required to enable remote validation of species metrics to occur effectively, including:

  In situ georeferenced photographs of baselining methods and outputs where possible,

  Amendments to management and monitoring plans to enable a description of methodical approach including rationale for locations chosen

- The use of georeferenced photography adds to the body of documentary evidence and enables an analysis of data that is consistent with what was seen at the time by the project developer and so limits impact of seasonal variation in date of on-site assessment

- Competency of staff responsible for undertaking sampling strategy and assessment of outputs is required (this should be by metric)

- Consideration should be given to appropriateness of invert species selection based on the projected habitat transition – particularly with regard to woodland creation

- Use of third party for monitoring methods, including metabarcoding and bioacoustics, require Code criteria which ensures the efficacy of the method can be evidenced and that competency of individuals can be demonstrated

6.0 Ineligible baseline datasets – what good does not look like

Baseline data for Ercistaine included significant data issues

Issues with datasets for invert monitoring are also evident in the Rottal datasets.

- Rottal

Sampling site RT_10 was not sampled during the first round of invert surveys. In mitigation, average abundance of each order sampled at station RT_10 in August and September as an estimate for the abundance of invertebrates that would have been collected in July. This response is not sufficient as part of robust baseline datasets.

The previously mentioned issues identified as part of metabarcoding outputs (see 5.1.1) with discrepancies between outputs and physical identification are also problematic.

- Ericstaine

Recorder *35d2d0c2* started recording a week before the other recorders because the recorder was turned on in transit. The recorder has been removed from dataset, with the project limited to only 2 records. This limits the capacity of the ongoing monitoring of the site and the reliability of the data

Stated invert monitoring methods were not implemented on site due to the presence of cattle across the project area, which were deemed a safety risk by the ecologist.

Instead sampling sites were visited on 30th August, 13th September, and 27th September. However, no visits were undertaken in May or June as stated within the methodology. This meant species identified were limited to late summer and likely excluded species present earlier in the summer.

In addition, two stations were not sampled during all visits: station 8 was not visited on the 13th September, and station 10 was not visited on the 30th August, meaning these stations were only surveyed twice.

Pollinators were sampled by hand-collecting any invertebrates found on top of vegetation. Detritivores were sampled by performing a detailed ground search. Each search method was conducted for 10 minutes. This approach was inherently biased towards species that could be easily captured and, consequently, larger taxa such as spiders, caddisflies, caterpillars, and ants were more likely to be sampled.

During the second and third visits, the same sampling areas and methods were used for pollinators and detritivores; however, instead of hand-collecting specimens, a hand vacuum cleaner equipped with a fine mesh sock was used to capture invertebrates more effectively. Unfortunately, samples of pollinators and detritivores were not stored in separate containers; instead, all invertebrates collected from a single station were combined into a single sample. This prevented the analysis of pollinators and detritivores

as distinct metrics. Consequently, the data were analysed as a single, combined metric for 'general invertebrates' with inconsistency in methodological approaches in how the data was gathered.

- Identification of survey issues

Importantly, there needs to be a way of ensuring that issues can be readily identified at validation. All data issues were evident based on reporting from project developer. However, they would not have been apparent if assessing only data outputs, which had been averaged in some instances etc. It is important that as part of validation raw datasets are provided to compare with finalised data outputs against each species metric.

7. Fordie pilot validation report

Auditee:	Fordie Estate
Scope of assessment:	Biodiversity Crediting Pilot
Audit Date:	08/11/2024
Audit Team: *SA Certification*	Jon Watts (VVTL) Eamonn Flood (Technical Expert) MCIEEM Andy Grundy (Technical Expert) MICFor
IUCN scope definition	This process is different for carbon, so we want feedback on what needs to be different. This is piloting, so in addition to the site visit, the validators and ecologists should submit feedback to Joseph Anderson with regards to what should be changed for successful implementation of future validations.

Requirement	Guidance	Means of validation	Note evidence of compliance
1. Site			
Site overview/information	Provide an overview of the site, include: - Habitat types - Biodiversity metrices used Within 'means of validation' provide	*Fordie Habitats BNG Baseline BU_Issue1 (1).pdf*	Fordie Estate is located in Perthshire, Scotland. The Site covers the afforested area in the south near Fordie Estate up to the mountain Ben Chonzie in the north. The southern section of the Site is a mixture of conifer plantation, broadleaf woodland plantation and other mixed broadleaf woodland, with some open areas with scrub or wetland. To the north of the

	reference to documentation seen		forested area is predominantly open ground dominated mostly by grassland and heath, with some areas extensively grazed and some restricted from grazing. Some broadleaf tree planting has already been undertaken in the area. Deer and other herbivores have been excluded from large areas of the lower site. The upland part of the Site lies to the north, and includes areas of blanket bog, acidic grassland, montane acidic grassland, and dry and wet heath. Biodiversity metrics used on site at baseline include Defra Metric & UK Habs survey condition assessment (structural), higher plants, birds, beetles and spiders
2. Structural metric			
Mapping and Monitoring Strategy (a)	Define structural metric used (e.g. Defra metric) Within 'Means of validation' reference documentation seen (e.g. mapping to UK Habs 4., Completed copy of Defra Metric	*Fordie Habitats BNG Baseline BU_Issue1 (1).pdf* *BNG baseline-HAB-Con Alpha Tool_IR-Fordie- Full site-FIRNS-baselineonly*	UKHab Survey and condition assessment denotes habitats by type, condition and coverage (3.1 UKHab Survey). This corresponds with mapping provided (Appendix A.) Defra Metric for baseline has been completed, includes assessment of habitat condition, distinctiveness, and strategic significance. Corresponds with survey report. On-site assessment undertaken against sample of habitat against type and condition assessment.
Mapping and Monitoring Strategy (a)	Does the project have an independently approved biostatistical sampling method? Reference the document name, date, and approval.		No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site.
Mapping and Monitoring Strategy (a)	Define validation sampling approach, state justification for areas selected for sampling		Areas identified for sampling on basis of variability in habitat type, condition and location.

Mapping and Monitoring Strategy (a)	(a) The Validation team shall review the map and relevant documentation to see where monitoring occurred. The following questions will be answered: (i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method? If not, is 80% of the sampling within the explicit guidance, or is there reasonable justification for changes and appropriate systems of correction?	*Fordie Habitats BNG Baseline BU_Issue1 (1).pdf*	No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site. Sampling location Reference 56.404736, -3.937268 evidenced potentially incorrectly mapped polygon as h1b5 - Dry Heaths, Upland (H4030), which should instead have been mapped as a continuation of the adjacently mapped f2c - Upland Flushes, Fens and Swamps Sampling location reference 56.404245, -3.979791 mapped as g1b5 - Montane Acid Grasslands, it was noted on site that this area may more accurately be denoted as 'g1c - Bracken'. However, this may be a habitat type change from initial survey that might be attributable to subsequent fencing and deer control.
Mapping and Monitoring Strategy (a) - Evidence of Technical Competence	Is survey assessor competency documented and appropriate to metric surveyed ?	*Fordie Habitats BNG Baseline BU_Issue1 (1).pdf*	Yes, High level of technical competence evidenced as part of reporting Ref Fordie *Habitats BNG Baseline BU_Issue1 (1).pdf* *Kirstie Hazelwood, MSc, PhD, ACIEEM* *Ida Bailey, BSc (Hons), PhD, ACIEEM, CERPIT* *Bob Edmonds BSc MCIEEM CEnv*
Mapping and Monitoring Strategy (b)	(b) While working with the ecologist, note if there are any areas that seem underrepresented in the mapping, and investigate why in a		Site visit conducted against sampling approach that identified areas to assess based on variability in habitat type, and location and ease of site accessibility during validation. No high-risk areas identified as underrepresented as part of mapping. Assessment considered

	conversation with the project developers or by visiting those areas during the site		boundaries between habitat types as part of assessment of survey and condition monitoring.
Mapping and Monitoring Strategy - habitat type (b)	Sample areas within the mapping to determine if baseline habitat type has been correctly mapped in all instances		Sampling review undertaken against UK Habs habitat type (see Table 1). An assessment based on habitat indicators informed by identifiable vegetation aligned with habitat types denoted within baseline UK Habs survey.
Habitat Condition (a)	(a.) Sites Should have submitted a habitat condition map or data i. UK Hab for Woodlands, Peatland Condition Matrix for Peatlands	*Fordie Habitats BNG Baseline BU_Issue1 (1).pdf*	Condition assessment in place in form of Defra Metric and as per reporting against UK Habs survey
Habitat Condition (b)	b. The ecologist shall review this site map and the habitat condition data to see if the UKhab condition categories align appropriately. The ecologist shall then identify the areas with the highest risk of inaccuracy, and validate the habitat condition scores during the site visit.		Sampling review undertaken against UK Habs habitat type (see Table 1). Assessment against habitat condition undertaken confirmed alignment with baseline condition assessment
Non-structural Metric (Inverts)			
Metric	Define non-structural metric used	*Fordie Baseline Beetle and Spider Monitoring Report 2024_Issue1*	Spiders and beetles were monitored for project baseline using fixed 2m x 2m quadrats with outputs (*Invertebrate Plot Data for Analysis*) recorded to species level (order, family, taxon) and stage (with reference to location coordinates, habitat type, method (bugvac), surveyor, conservation value, IUCN least concern, and quantity

		Invertebrate Plot Data for Analysis	
Mapping and Monitoring Strategy (a)	(a) The Validation team shall review the map and relevant documentation to see where monitoring occurred. The following questions will be answered: (i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method? If not, is 80% of the sampling within the explicit guidance, or is there reasonable justification for changes and appropriate systems of correction?		No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site.
Mapping and Monitoring Strategy (a) **Evidence of Technical Competence**	Is survey assessor competency documented and appropriate to metric surveyed	*Fordie Baseline Beetle and Spider Monitoring Report 2024_Issue1*	Competency of surveyor undertaking baseline survey was not possible as data not included as part of data provided, *Fordie Baseline Beetle and Spider Monitoring Report 2024_Issue1*
Mapping and Monitoring Strategy (b)	Define sampling approach, state justification for areas selected for sampling		Monitoring occurred at defined locations as part of output data, enabling a visit to survey locations at validation to assess whether outputs are accommodated by habitat type and condition. Survey areas selected based on variability of habitat types and accessibility as part of pilot validation.

Insect monitoring (a)	(a.)The validator and ecologist shall visit the locations where insect monitoring occur and look for evidence of the monitoring. i. In this case, look if there is evidence that the pitfall traps were dug, where the pan traps were laid ii. Review the baseline report to determine if other methods were used and look for evidence of appropriate application of technique		It was not possible to find readily identifiable invert sampling, including evidence of trenches for pitfall traps having been dug
Insect monitoring (b)	(b.) The ecologist review the results of the baseline and determine if the results are reasonable based on what is observed on the site visit and at the monitoring locations.		Assessment of habitat type and condition evidence that baseline outputs stated are reasonable.
Non-structural Metric (Birds)			
Metric	Define metric used	*Fordie Biodiversity Monitoring Ornithology Report Issue1*	Breeding bird survey Modified Common Bird Census (CBC) approach was used. Section 2.1 of baseline reporting defines 'fieldwork methodology'. Clear definition of process to enable repeatability as part of future monitoring. Each parcel was surveyed three-times with surveys undertaken between mid-April to late June 2023. Definition provided to determine scope of 'breeding bird' to define counts.

Mapping and Monitoring Strategy (a)	(a) The Validation team shall review the map and relevant documentation to see where monitoring occurred. The following questions will be answered: (i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method? If not, is 80% of the sampling within the explicit guidance, or is there reasonable justification for changes and appropriate systems of correction?	*Fordie BBS Plot Data for Analysis* *Fordie Biodiversity Monitoring Ornithology Report Issue1*	*Appendix A Drawings within Fordie Biodiversity Monitoring Ornithology Report Issue1* defines numbered breeding bird areas - this is traceable to output: *Fordie BBS Plot Data for Analysis* Species have additionally been mapped (initialised with key) across the site in relation to habitat types with distinction made between breeding/non-breeding.
Mapping and Monitoring Strategy (a)	(i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method?		No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site.
Mapping and Monitoring Strategy (b) **Evidence of Technical Competence**	Is survey assessor competency documented and appropriate to metric surveyed	*Fordie Biodiversity Monitoring Ornithology Report Issue1*	Yes, Cróna McMonagle (MSc, ACIEEM) a senior ecologist with seven years' experience working in ecology, with a focus largely on ornithology. Kirstie Hazelwood (MSc, PHD, ACIEEM): senior ecologist with eight years' experience in ecology, with expertise of a

			range of ornithology surveys including upland breeding bird and black grouse surveys and extensive experience in ornithology
Mapping and Monitoring Strategy (c)	Define sampling approach, state justification for areas selected for sampling		Monitoring occurred at defined locations as part of output data, enabling a visit to survey locations at validation to assess whether outputs are accommodated by habitat type and condition. Survey areas selected based on variability of habitat types and accessibility as part of pilot validation.
Bird Monitoring (a)	(a.)The validator and ecologist shall visit the locations where bird monitoring occur and look for evidence of the monitoring. i. In this case, look if there is evidence that the bioacoustics monitors could be hung in the right location ii. Review the baseline report to determine if other methods were used and look for evidence of appropriate application of technique	*Fordie Biodiversity Monitoring Ornithology Report Issue1* *Fordie BBS Plot Data for Analysis*	No evidence of bird monitoring could be identified as part of site-visit due to nature of survey undertaken. Survey approach defined in reporting appropriate and well evidenced with verifiable outputs.
Bird Monitoring (b)	(b.) The ecologist review the results of the baseline and determine if the results are reasonable based on what is observed on the site visit and at the monitoring locations		Review of species present as part of data outputs are reasonable based on survey approach, habitats and their condition.

Non-structural Metric (Plants)			
Metric	Define metric used	*Fordie Baseline Higher Plant Monitoring Report 2023_Issue2*	Higher plants ground flora was monitored using fixed 2m x 2m quadrats. In woodland or scrub areas 10m x 10m quadrats were used to sample tree and shrub species, paired with the 2m x 2m quadrats to record ground level species. Samples were taken at 60 locations across the Site, with representation from most habitats and their proposed changes
Mapping and Monitoring Strategy (a)	(i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method?		No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site.
Mapping and Monitoring Strategy (b) **Evidence of Technical Competence**	Is survey assessor competency documented and appropriate to metric surveyed	*Fordie Baseline Higher Plant Monitoring Report 2023_Issue2*	Yes, Ida Bailey MCIEEM and Kirstie Hazelwood ACIEEM
Mapping and Monitoring Strategy (c)	Define sampling approach, state justification for areas selected for sampling		Monitoring occurred at defined locations as part of output data, enabling a visit to survey locations at validation to assess whether outputs are accommodated by habitat type and condition. Survey areas selected based on variability of habitat types and accessibility as part of pilot validation.
High Plant Monitoring (b)	(b.) The ecologist review the results of the baseline and determine if the results are reasonable based on what is observed on	*Fordie Vegetation Quadrat Data For Analysis*	Higher plants identified on site consistent with assessment undertaken as part of on-site validation – see Table 1. Outputs from monitoring included location, taxon group, species, common name, percentage cover, value

	the site visit and at the monitoring locations		

Table 1. Assessment of habitat type and condition against *Fordie Habitats BNG Baseline BU_Issue1 (1).pdf*

Survey point Ref	Habitat Type	Condition	Validation against condition	Species observed
1	f2c - Upland Flushes, Fens and Swamps	Moderate/Good	Accurate habitat category and condition assessment, flush has typical array of species (NVC M6 flush sub-community M6c). Lateral flow of groundwater, no INNs noted or obvious erosion channels. Relatively species abundant	*Juncus acutiflorus, J effusus, Deschampsia cespitosa, Polytrichum commune, Blechnum spicant, Festucs rubra, F vivipara, Erica tetralix, Sphagnum capillifolium, Hylochomium splendens, Violoa palustris, Carex panicea, Eriophorum angustofolium, Eriophorum vaginatum,Holcus lanatum, Cirsium palustre, Succisa pratensis, Narthesium ossifragum, Sphagnum denticulatum, Rhytidiadelphus squarrosum, Ranunculus* sp.
2	h1b5 - Dry Heaths, Upland (H4030)	Poor/Moderate/ Good	Accurate habitat category, habitat condition categories rather broad (retrospective comparison with habitat condition methodology scored 'moderate'. Typical NVC H10 community, dominated by C. vulgaris which comprises most of groundcover. Some species associated	*Calluna vulgaris, Erica cinerea, Arctostaphylos uva-ursi, Trichophorum germanicum, Deschampsia flexuosa, Eriophorum vaginatum, Pteridium aquilinium, Potentilla erecta, Cladonia sp.*

			with wet heath present. Likely a mosaic of mostly dry heath with small, wetter hollows. Bracken beginning to colonise (less than 10% of cover) . Scots pine planting at south west of polygon.	
4	h1b5 - Dry Heaths, Upland (H4030)	Poor/Moderate/ Good	Accurate habitat category, habitat condition categories rather broad	*Calluna vulgaris, Erica cinerea, Arctostaphylos uva-ursi, Trichophorum germanicum, Deschampsia flexuosa, Eriophorum vaginatum, Pteridium aquilinium, Potentilla erecta, Cladonia sp.*
6	g1b5 - Montane Acid Grasslands (H6150)	Good	Appears healthy, varied sward height and composition, no INNS, low ground cover of scrub/bracken & no obvious negative interventions. Some wetter hollows visible with bog/wet heath species	*Festuca vivipara, F. rubra, F oxina, Nardus stricta, Rhytidiadelphus squarrosus, Potentilla erecta, Sphagnum papillosum, S. capillifolium, Trichophorum germanicum, Narthesium ossifragum*
7	f1a5 - Blanket Bog (H7130)	Moderate	Accurate habitat category and condition assessment. Some apparent historical modification, probably drained at some point in the past and/or heavily grazed. No evidence of recent muirburn. Mounding of new trees at eastern periphery	*Eriophorum vaginatum, Calluna vulgaris, Erica tetralix, Sphagnum papillosum, S. capillifolium, Arctostaphylos uva-ursi, Trichophorum germanicum, Narthesium ossifragum, other Polycarpus mosses*
9	g1b5 - Montane	Good	Accurate habitat category and	*Festuca vivipara, F. rubra, F oxina,*

	Acid Grasslands (H6150)		condition assessment, rather damp, probably in mosaic, with small damp hollows with wet heath/bog species. Composition and condition similar to previous Acid Grassland polygon	*Nardus stricta, Rhytidiadelphus squarrosus, Potentilla erecta, Sphagnum papillosum, S. capillifolium, Trichophorum germanicum, Narthesium ossifragum*
15	w1d - Wet Woodland	Poor/Moderate	Accurate habitat condition. Evidence of alder phytophthora	
16	w1a5 - Western Acidic Oak Woodland (H91A0)	Good	Planted woodland – no full assemblage of species – existing oaks evidenced	

8. Ridge Rottal pilot validation report

Auditee:	Ridge Rottal
Scope of assessment:	Biodiversity Crediting Pilot
Audit Date:	07/11/2024
Audit Team: *SA Certification*	Jon Watts (VVTL) Eamonn Flood (Technical Expert) MCIEEM
IUCN scope definition	This process is different for carbon, so we want feedback on what needs to be different. This is piloting, so in addition to the site visit, the validators and ecologists should submit feedback to Joseph Anderson with regards to what should be changed for successful implementation of future validations.

Requirement	Guidance	Means of validation	Note evidence of compliance
1. Site			
Site overview/information	Provide an overview of the site, include: - Habitat types - Biodiversity metrices used Within 'means of validation' provide reference to documentation seen	*Ridge Rottal Biodiversity Baseline 2024 Final Report (002)*	Ridge Rottal is a 84 ha area of degraded peatland habitat located in the Angus Glens, eastern Scotland. Baseline peatland condition assessment was not submitted in advance of the pilot assessment and so could not be included in the scope of this assessment. Species metrics included: - Abundance and species richness of plants - Abundance and species richness of breeding birds - Abundance and species richness of pollinators - Abundance and species richness of detritivores
Non-structural Metric (Plants)			
Metric	Define non-structural metric used	*Copy of Ridge Rottal Final Report*	Data required to assess plant abundance and species richness is collected by nonexperts through the Mozaic Earth app.

		Appendices (002) *Ridge Rottal Biodiversity Baseline 2024 Final Report (002)*	
Mapping and Monitoring Strategy (a)	(a) The Validation team shall review the map and relevant documentation to see where monitoring occurred. The following questions will be answered: (i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method? If not, is 80% of the sampling within the explicit guidance, or is there reasonable justification for changes and appropriate systems of correction?		No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site. Methodological approach requires Mozaic Earth App end-users to specific 1 ha sampling plots that have been distributed to ensure that each habitat type is sampled proportionately to its coverage across the project site. Further information required on how sampling locations have been determined – this could be informed by management/monitoring plan.
Mapping and Monitoring Strategy (a) **Evidence of Technical Competence**	Is survey assessor competency documented and appropriate to metric surveyed		Survey is non-technical expert providing photography within scope of Mozaic Earth App methodology. Trianing required – what they should capture,. Competency information is required concerning technical expert reviewing the data. This should be accommodated as part of Key Document structure.
	Define sampling approach, state		Project monitoring occurred at defined locations as defined in output data

Mapping and Monitoring Strategy (b)	justification for areas selected for sampling		provided by Replanet/Mozaic Earth. This enabled a visit to sampled survey locations at validation to assess whether outputs are supported by habitat type and condition. Survey areas selected on a sampling basis based on variability of habitat types and accessibility as part of pilot validation.
High Plant Monitoring (b)	(b.) The ecologist review the results of the baseline and determine if the results are reasonable based on what is observed on the site visit and at the monitoring locations	*Ridge Rottal Biodiversity Baseline 2024 Final Report (002)* *Copy of Ridge Rottal Final Report Appendices (002)*	Higher plants identified on site have been compared against images captured and summary provided for reporting outputs to species level by Replanet/Mozaic Earth. Plant species identified by the project developer are consistent with sample assessment undertaken as part of on-site validation – see Table 1. In one instance, *Carex bigelowii* appears within species list. This is not evident within the photography and would not typically be found in this habitat or altitude Outputs from monitoring included location, species, conservation score, and relevant abundance. Plant reporting fields included in monitoring outputs should be specified by Code to a minimum level.
Non-structural Metric (Breeding birds)			
Metric	Define metric used	*Ridge Rottal Biodiversity Baseline 2024 Final Report (002)* *Copy of Ridge Rottal Final Report Appendices (002)*	Abundance and species richness measured using bioacoustic recorders. Each parcel was surveyed three-times with surveys undertaken between mid-April to late June 2023. Definition provided to determine scope of 'breeding bird' to define counts.
Mapping and Monitoring Strategy (a)	(a) The Validation team shall review the map and relevant documentation to see where monitoring occurred. The		Bioacoustic recorder locations are defined within mapping provided. No 'sampling methodology approved by the independent organization that approved

	following questions will be answered: (i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method? If not, is 80% of the sampling within the explicit guidance, or is there reasonable justification for changes and appropriate systems of correction?		biostatistical sampling method' to assess against as part of this pilot site. Rationale should be defined within key documents to support sampling locations.
Mapping and Monitoring Strategy (a)	(i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method?		No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site. Reporting states that bioacoustic recorders are strategically placed throughout the project site and are set to record continuously for a 1-month period during the bird breeding season, i.e. April to June. However, there is no evidenced rationale for why specific sites have been selected. Reporting references that, 'the devices are provided by Hula Earth (https://hula.earth/) who also perform the subsequent analysis'. However the report subsequently states that, 'bioacoustic devices are returned to Carbon Rewild where the recordings are extracted and analysed using a machine learning algorithm'. There is an inconsistency in the reporting here. How has the efficacy of the algorithm been determined? This is applicable to use of any no-human or third party analysis of biodiversity data.

Mapping and Monitoring Strategy (b) **Evidence of Technical Competence**	Is survey assessor competency documented and appropriate to metric surveyed	*Fordie Biodiversity Monitoring Ornithology Report Issue1*	Devices are provided by Hula Earth (https://hula.earth/) who also perform the subsequent analysis of the recordings. Reporting denotes that sample is assessed by expert ornithologist, however no details are provided of the competency of this expert. No competency information has been provided for this third party operator? What controls are needed when a project developer seeks to use a third party?
Mapping and Monitoring Strategy (c)	Define sampling approach, state justification for areas selected for sampling		Monitoring occurred at defined locations as part of output data, enabling a visit to survey locations at validation to assess whether outputs are accommodated by habitat type and condition. Survey areas selected based on variability of habitat types and accessibility as part of pilot validation.
Bird Monitoring (a)	(a.)The validator and ecologist shall visit the locations where bird monitoring occur and look for evidence of the monitoring. i. In this case, look if there is evidence that the bioacoustics monitors could be hung in the right location ii. Review the baseline report to determine if other methods were used and look for evidence of appropriate application of technique		No evidence of bird monitoring could be identified as part of site-visit due to nature of survey undertaken. Only inference can be made by validation ecologist of whether birds identified are reasonable given location, habitat and habitat condition type.

Bird Monitoring (b)	(b.) The ecologist review the results of the baseline and determine if the results are reasonable based on what is observed on the site visit and at the monitoring locations		Review of species present as part of data outputs are reasonable based on survey approach, habitats and their condition. In one instance, we would query the inclusion of Rock pipit *Anthus petrosus,* which typically has a costal distribution. Unlikely to be present in moorland habitat. Potentially an AI issue? What oversight has there been of datasets. Black-tailed Godwit *Limosa limosa* What about over wintering birds?
Non-structural Metric (Pollinators & detritivores)			
Metric			Ten invertebrate monitoring stations were established, each consisting of a pollinator pan trap and five detritivore pitfall traps. Pan traps and pitfall traps were opened in July, August and September for a 24-hour period. Site RT_10 was not included in the first round of surveys
Mapping and Monitoring Strategy (a)	(i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method?		No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site. There is no rationale for sampling locations used – there should be a mechanism for communicating this.
Mapping and Monitoring Strategy (b) **Evidence of Technical Competence**	Is survey assessor competency documented and appropriate to metric surveyed		Identification via metabarcoding analysis. There is no information concerning competency of third party undertaking the analysis. There should be defined criteria for use of third party metabarcoding or other assessment method. Reporting from Re-Planet highlights that the metabarcoding results generally align

			with the visual identifications of taxonomic groups to the order or class level but that some discrepancies were observed (elaborate
Mapping and Monitoring Strategy (c)	Define sampling approach, state justification for areas selected for sampling		Visiting survey locations did not provide a means of validation. It was not possible to identify evidence of survey occurring based on coordinates. A possible pitfall location was identified but at differing coordinates.
Insect monitoring (b)	(b.) The ecologist review the results of the baseline and determine if the results are reasonable based on what is observed on the site visit and at the monitoring locations.		Assessment of habitat type and condition evidence that baseline outputs stated are reasonable.

Table 1. Sample assessment of plant species against *Ridge Rottal Biodiversity Baseline 2024 Final Report (002), outputs via Mozaic Earth, & Copy of Ridge Rottal Final Report Appendices (002)*

Survey point Ref	Plant species identified within reporting	Assessment comments
RT_PL_08	*Vaccinium myrtillus* Polytrichum commune *Pleurozium schreberi* *Calluna vulgaris* *Nardus stricta* *Eriophorum vaginatum* *Vaccinium vitis-idaea* *Festuca ovina* *Deschampsia flexuosa* *Sphagnum capillifolium* *Juncus acutiflorus* *Galium saxatile* *Potentilla erecta* *Carex bigelowii*	Typical of wet heath/acid grassland. Images within Moazic Earth provide a fair representation of species list. In one instance, *Carex bigelowii* appears within species list. This is not evident within the photography and would not typically be found in this habitat or altitude. This is an alpine artic species – more likely present in a Montaine environment at higher altitude and not typically among the other species listed.

	Carex echinata *Trichophorum cespitosum* *Luzula multiflora* *Trientalis europaea* *Rhytidiadelphus squarrosus* *Poa pratensis* *Juncus effusus* *Molinia caerulea* *Cladonia species*	
RT_PL_02	*Vaccinium myrtillus* *Polytrichum commune* *Pleurozium schreberi* *Calluna vulgaris* *Nardus stricta* *Eriophorum vaginatum* *Vaccinium vitis-idaea* *Festuca ovina* *Deschampsia flexuosa* *Sphagnum capillifolium* *Juncus acutiflorus* *Galium saxatile* *Potentilla erecta* *Anthoxanthum odoratum* *Carex bigelowii* *Carex echinata* *Luzula multiflora* *Trientalis europaea* *Rhytidiadelphus squarrosus* *Erica tetralix* *Agrostis stolonifera* *Poa pratensis* *Festuca rubra* *Carex nigra* *Carex panicea* *Festuca vivipara* *Festuca pratensis* *Juncus effusus* *Holcus lanatus* *Rumex acetosa* *Dryopteris carthusiana* *Cerastium holosteoides* *Oxalis acetosella* *Ranunculus acris* *Ranunculus repens* *Myosotis scorpioides*	Typical of wet heath/acid grassland. Again, we would query the inclusion of *Carex bigelowii*

9. Ericstaine pilot validation report

Auditee:	Ericstaine
Scope of assessment:	Biodiversity Crediting Pilot
Audit Date:	22/01/2025
Audit Team: *SA Certification*	Jon Watts (VVTL) Eamonn Flood (Technical Expert) MCIEEM
IUCN scope definition	This process is different for carbon, so we want feedback on what needs to be different. This is piloting, so in addition to the site visit, the validators and ecologists should submit feedback to Joseph Anderson with regards to what should be changed for successful implementation of future validations.

Requirement	Guidance	Means of validation	Note evidence of compliance
1. Site			
Site overview/information	Provide an overview of the site, include: - Habitat types - Biodiversity metrices used Within 'means of validation' provide reference to documentation seen		Ericstane is located in the Southern Uplands of Scotland and the biodiversity baseline pilot project area is 116 ha. The IUCN pilot project basket of metrics at Ericstane was comprised of plant diversity, breeding bird diversity, pollinator diversity, and detritivore diversity Baseline condition assessment was not provided for the pilot assessment. Species metrics included: - Abundance and species richness of plants - Abundance and species richness of breeding birds - Abundance and species richness of pollinators - Abundance and species richness of detritivores

Non-structural Metric (Plants)			
Metric	Define non-structural metric used		Data required to assess plant abundance and species richness is collected by nonexperts through the Mozaic Earth app.
Mapping and Monitoring Strategy (a)	(a) The Validation team shall review the map and relevant documentation to see where monitoring occurred. The following questions will be answered: (i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method? If not, is 80% of the sampling within the explicit guidance, or is there reasonable justification for changes and appropriate systems of correction?		No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site. Methodological approach requires Mozaic Earth App end-users to specific 1 ha sampling plots that have been distributed to ensure that each habitat type is sampled proportionately to its coverage across the project site. Further information required on how sampling locations have been determined – this could be informed by management/monitoring plan. Random may not cover all habitat types
Mapping and Monitoring Strategy (a) **Evidence of Technical Competence**	Is survey assessor competency documented and appropriate to metric surveyed		Survey is non-technical expert providing photography within scope of Mozaic Earth App methodology. Competency information is required concerning technical expert reviewing the data. This should be accommodated as part of Key Document structure.
Mapping and Monitoring Strategy (b)	Define sampling approach, state justification for areas selected for sampling		Project monitoring occurred at defined locations as defined in output data provided by Replanet/Mozaic Earth. This enabled a visit to sampled survey locations

			at validation to assess whether outputs are supported by habitat type and condition. Survey areas selected on a sampling basis based on variability of habitat types and accessibility as part of pilot validation.
High Plant Monitoring (b)	(b.) The ecologist review the results of the baseline and determine if the results are reasonable based on what is observed on the site visit and at the monitoring locations		Higher plants identified on site have been compared against images captured and summary provided for reporting outputs to species level by Replanet/Mozaic Earth. Plant species identified by the project developer are consistent with sample assessment undertaken as part of on-site validation – see Table 1. Outputs from monitoring included location, species, conservation score, and relevant abundance. Plant reporting fields included in monitoring outputs should be specified by Code to a minimum level.
Non-structural Metric (Breeding birds)			
Metric	Define metric used		Abundance and species richness measured using bioacoustic recorders. Four bioacoustic recorders were deployed across the project area between the 1st and 7th of July. Should field protocol define time period and frequency of locations? Issue with acoustic recorder in transport identified by Re-planet. Recorder 35d2d0c2 started recording a week before the other recorders because the recorder was turned on in transit. Has been removed from dataset.
Mapping and Monitoring Strategy (a)	(a) The Validation team shall review the map and relevant documentation to see where monitoring occurred. The following questions will be answered:		Bioacoustic recorder locations are defined within mapping provided. No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site.

	(i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method? If not, is 80% of the sampling within the explicit guidance, or is there reasonable justification for changes and appropriate systems of correction?		Rationale provided within reporting for site locations. *'The location of recorders were chosen to ensure all broad habitat types within the project area were sampled. The location of each recorder was separated by a minimum of 250 m. This minimum spacing follows recommendations to ensure independence of recordings for small passerine birds, minimising the risk of overlap in acoustic data (Metcalf et al., 2023)'.*
Mapping and Monitoring Strategy (a)	(i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method?		No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site. Reporting references that, 'the devices are provided by Hula Earth (https://hula.earth/) who also perform the subsequent analysis'. However the report subsequently states that, 'bioacoustic devices are returned to Carbon Rewild where the recordings are extracted and analysed using a machine learning algorithm'. There is an inconsistency in the reporting here. How has the efficacy of the algorithm been determined? This is applicable to use of any no-human or third party analysis of biodiversity data.
Mapping and Monitoring Strategy (b) **Evidence of Technical Competence**	Is survey assessor competency documented and appropriate to metric surveyed	*Fordie Biodiversity Monitoring Ornithology Report Issue1*	Devices are provided by Hula Earth (https://hula.earth/) who also perform the subsequent analysis of the recordings. Reporting denotes that sample is assessed by expert ornithologist, however no details are provided of the competency of this expert. No competency information has been provided for this third party operator? What

			controls are needed when a project developer seeks to use a third party?
Mapping and Monitoring Strategy (c)	Define sampling approach, state justification for areas selected for sampling		Monitoring occurred at defined locations as part of output data, enabling a visit to survey locations at validation to assess whether outputs are accommodated by habitat type and condition. Survey areas selected based on variability of habitat types and accessibility as part of pilot validation.
Bird Monitoring (a)	(a.)The validator and ecologist shall visit the locations where bird monitoring occur and look for evidence of the monitoring. i. In this case, look if there is evidence that the bioacoustics monitors could be hung in the right location ii. Review the baseline report to determine if other methods were used and look for evidence of appropriate application of technique		No evidence of bird monitoring could be identified as part of site-visit due to nature of survey undertaken. Only inference can be made by validation ecologist of whether birds identified are reasonable given location, habitat and habitat condition type. What about over wintering birds?
Bird Monitoring (b)	(b.) The ecologist review the results of the baseline and determine if the results are reasonable based on what is observed on the site visit and at the monitoring locations		Review of species present as part of data outputs are reasonable based on survey approach, habitats and their condition. What about over wintering birds?
Non-structural Metric (Pollinators & detritivores)			
Metric			Initial ten invertebrate monitoring stations were established at Ericstane, distributed

			within each of the plant plots. Seven stations were located in grassland, one in grazed grassland, and two in woodland. These methods were not implemented due to the presence of cattle across the project area. Instead, an ecologist conducted three rounds of surveys at each station. The stations were visited on the 30th August, 13th September, and 27th September. Issues identified within reporting included two stations not being sampled during all visits: station 8 was not visited on the 13th September, and station 10 was not visited on the 30th August, meaning these stations were only surveyed twice. Furthermore, the original plan to conduct surveys in May, June, and July was not realised, which limited the sampling to the late summer season and likely excluded species active earlier in the year. Pollinators were sampled by hand-collecting any invertebrates found on top of vegetation. Detritivores were sampled by performing a detailed ground search. Each search method was conducted for 10 minutes. This approach was inherently biased towards species that could be easily captured and, consequently, larger taxa such as spiders, caddisflies, caterpillars, and ants were more likely to be sampled. During the second and third visits, the same sampling areas and methods were used for pollinators and detritivores; however, instead of hand-collecting specimens, a hand vacuum cleaner equipped with a fine mesh sock was used to capture invertebrates more effectively. Unfortunately, samples of pollinators and detritivores were not stored in separate containers; instead, all invertebrates collected from a single station were combined into a single sample. This prevented the analysis of pollinators and

			detritivores as distinct metrics. Consequently, the data were analysed as a single, combined metric for 'general invertebrates.' There are serious concerns over the sufficiency and reliability of this data for validation. There is a need to see source data that has informed collated outputs. Outcomes from each individual survey. These issues would not have been identifiable unless disclosed by the project developer.
Mapping and Monitoring Strategy (a)	(i.) Does the distribution of monitoring locations and frequency match the sampling methodology approved by the independent organization that approved biostatistical sampling method?		No 'sampling methodology approved by the independent organization that approved biostatistical sampling method' to assess against as part of this pilot site. There is no rationale for sampling locations used – there should be a mechanism for communicating this.
Mapping and Monitoring Strategy (b) **Evidence of Technical Competence**	Is survey assessor competency documented and appropriate to metric surveyed		Identification via metabarcoding analysis. There is no information concerning competency of third party undertaking the analysis. There should be defined criteria for use of third party metabarcoding or other assessment method. Reporting from Re-Planet highlights that the metabarcoding results generally align with the visual identifications of taxonomic groups to the order or class level but that some discrepancies were observed.
Mapping and Monitoring Strategy (c)	Define sampling approach, state justification for areas selected for sampling		Visiting survey locations did not provide a means of validation. It was not possible to identify evidence of survey occurring based on coordinates. A possible pitfall location was identified but at differing coordinates.

Insect monitoring (b)	(b.) The ecologist review the results of the baseline and determine if the results are reasonable based on what is observed on the site visit and at the monitoring locations.		Assessment of habitat type and condition evidence that baseline outputs stated are reasonable.

Table 1. Sample assessment of plant species against

Survey point Ref	Plant species identified within reporting	Assessment comments
ERST01-PL-0009	*Holcus lanatus* *Ranunculus repens* *Juncus effusus* *Pteridium aquilinum* *Anthoxanthum odoratum* *Potentilla erecta* *Deschampsia cespitosa* *Rumex acetosa* *Cynosurus cristatus* *Agrostis stolonifera* *Cirsium palustre* *Galium palustre* *Molinia caerulea* *Poa pratensis* *Oxalis acetosella* *Arrhenatherum elatius* *Epilobium species* *Carex species* *Urtica dioica* *Deschampsia flexuosa* *Angelica sylvestris* *Polytrichum commune*	Mozaic Earth does not label all visible species per quadrat. In some instances the images seen do not reflect the conditions on the ground, assessors identified a flush on site at reference location that is not reflected in the photographs. *Juncus articulatus* identified in January on the ground is not reflected in species list. It was considered by the ecologist that this may indicate other species that have not been reflected in the baseline assessment are present. Assessor ecologist suggested that limitation of photography does not enable parting of ground to examine ground flora e.g. if you get a tall sward of graminoids this may hide species grown in the sward. Photography – species poor site with limited complexity of habitat plant communities. At a more diverse site it may be more difficult to accurately assess from photographic evidence.
ERST01-PL-0008	*Holcus lanatus* *Ranunculus repens* *Juncus effusus*	Consistent with grassland habitat site

	Pteridium aquilinum *Agrostis capillaris* *Anthoxanthum odoratum* *Rumex acetosa* *Cynosurus cristatus* *Agrostis stolonifera* *Cirsium palustre* *Galium palustre* *Trifolium repens* *Juncus articulatus* *Cirsium arvense* *Lolium perenne* *Ranunculus acris* *Trifolium repens s. repens* *Filipendula ulmaria* *Epilobium obscurum* *Leontodon autumnalis* *Leontodon hispidus* *Hypochoeris radicata* *Cirsium vulgare*	
ERST01-PL-0004	*Holcus lanatus* *Ranunculus repens* *Juncus effusus* *Pteridium aquilinum* *Agrostis capillaris* *Anthoxanthum odoratum* *Potentilla erecta* *Deschampsia cespitosa* *Rumex acetosa* *Cynosurus cristatus* *Agrostis stolonifera* *Cirsium palustre* *Trifolium repens* *Juncus articulates* *Trifolium repens s. repens* *Festuca rubra* *Plantago lanceolata* *Oxalis acetosella* *Dryopteris filix-mas* *Epilobium obscurum* *Veronica chamaedrys s. chamaedrys* *Carex nigra* *Salix cinerea* Betula pubescens Corylus avellana Rubus fruticosus s.l.	Consistent with grassland habitat site.