



RCS

Transforming Agriculture

Lets talk Soil Carbon



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Agriculture flounders and mines its resources because consumers will not pay the full price of food

CARBON or ENVIRONMENTAL credits provide a mechanism to return additional income to landholders

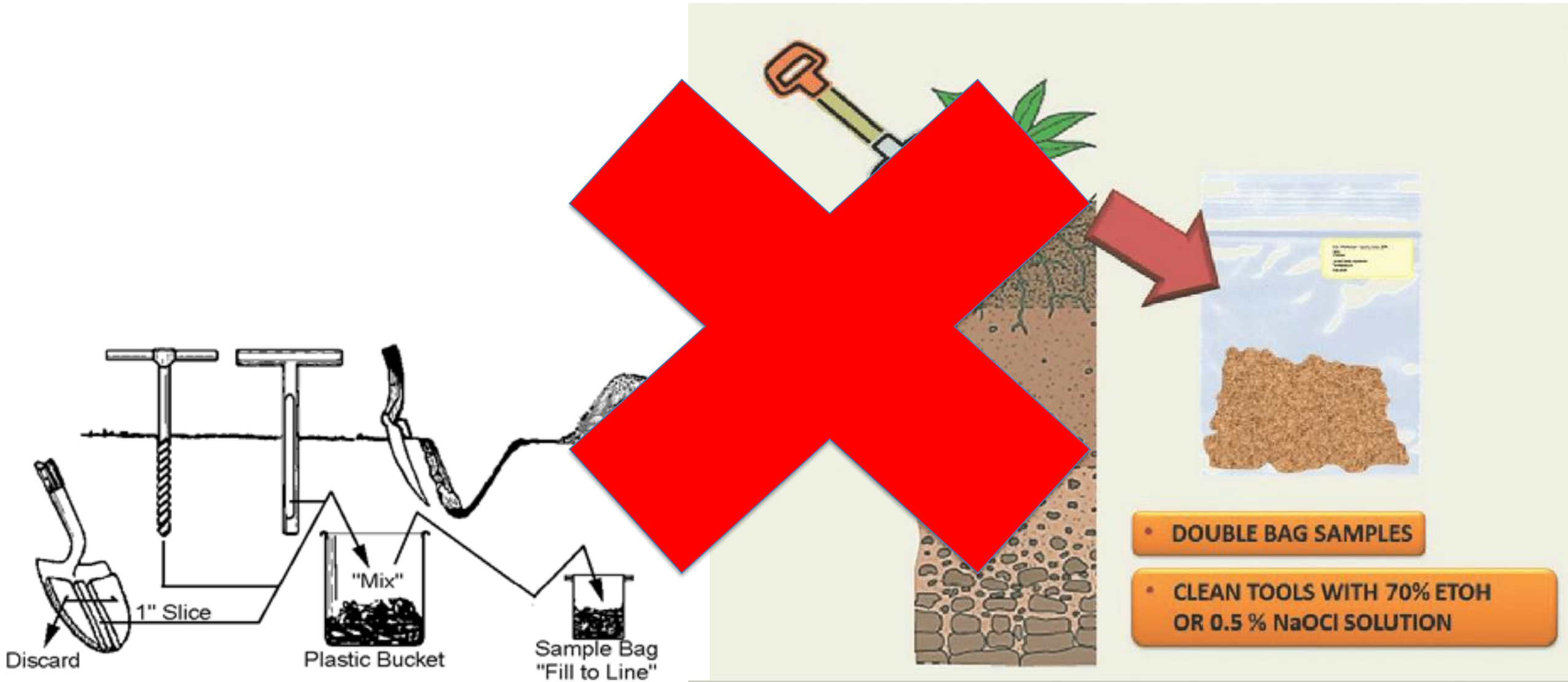


A choice to make – two aggregators

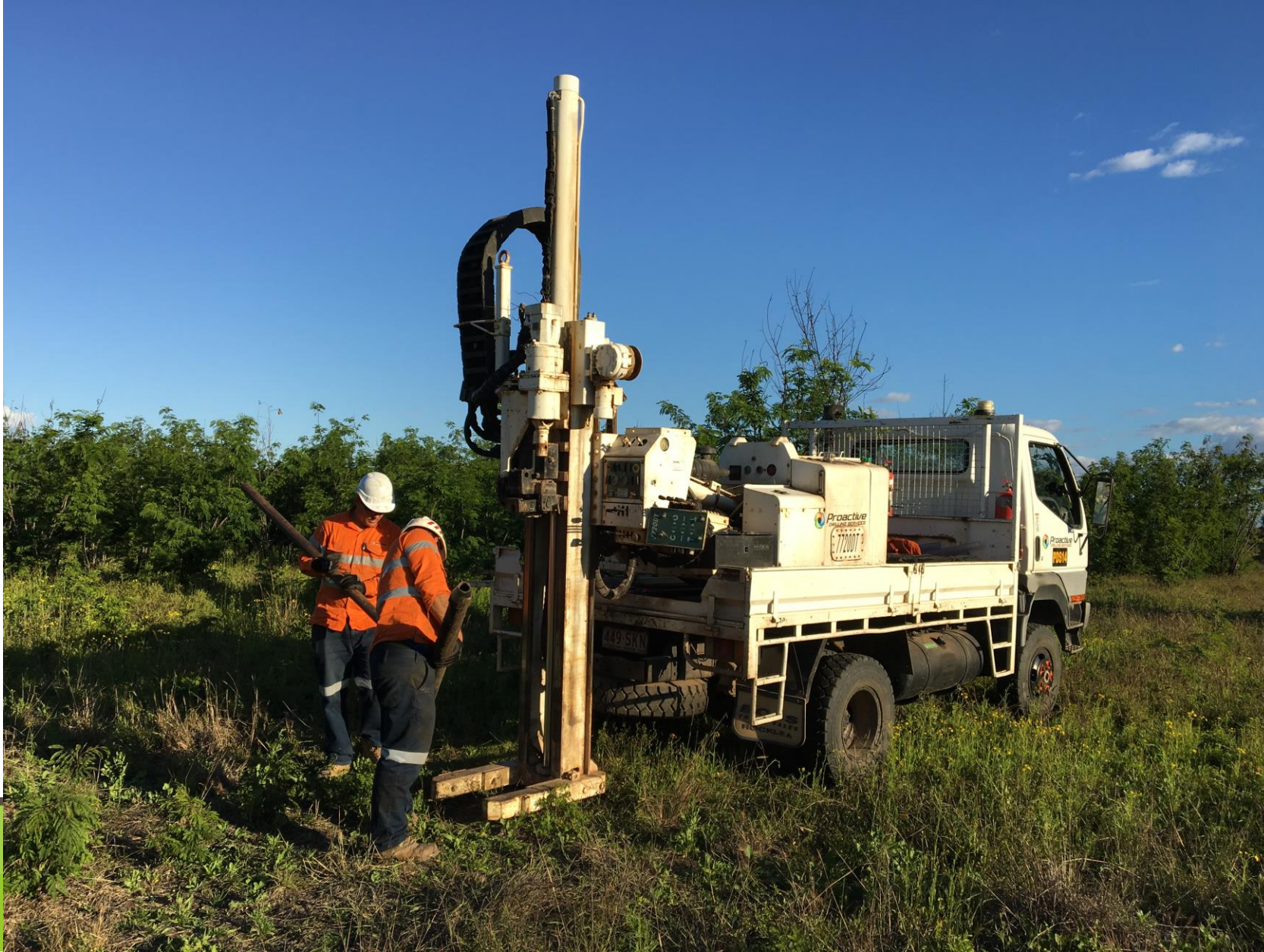
	A	B
Baseline Investment	\$2,250	\$20,000
Number of samples	9	50
Cost per sample	\$250	\$400
ACCU share	5%	18%



5. How is SOC measured?



Soil Sampling

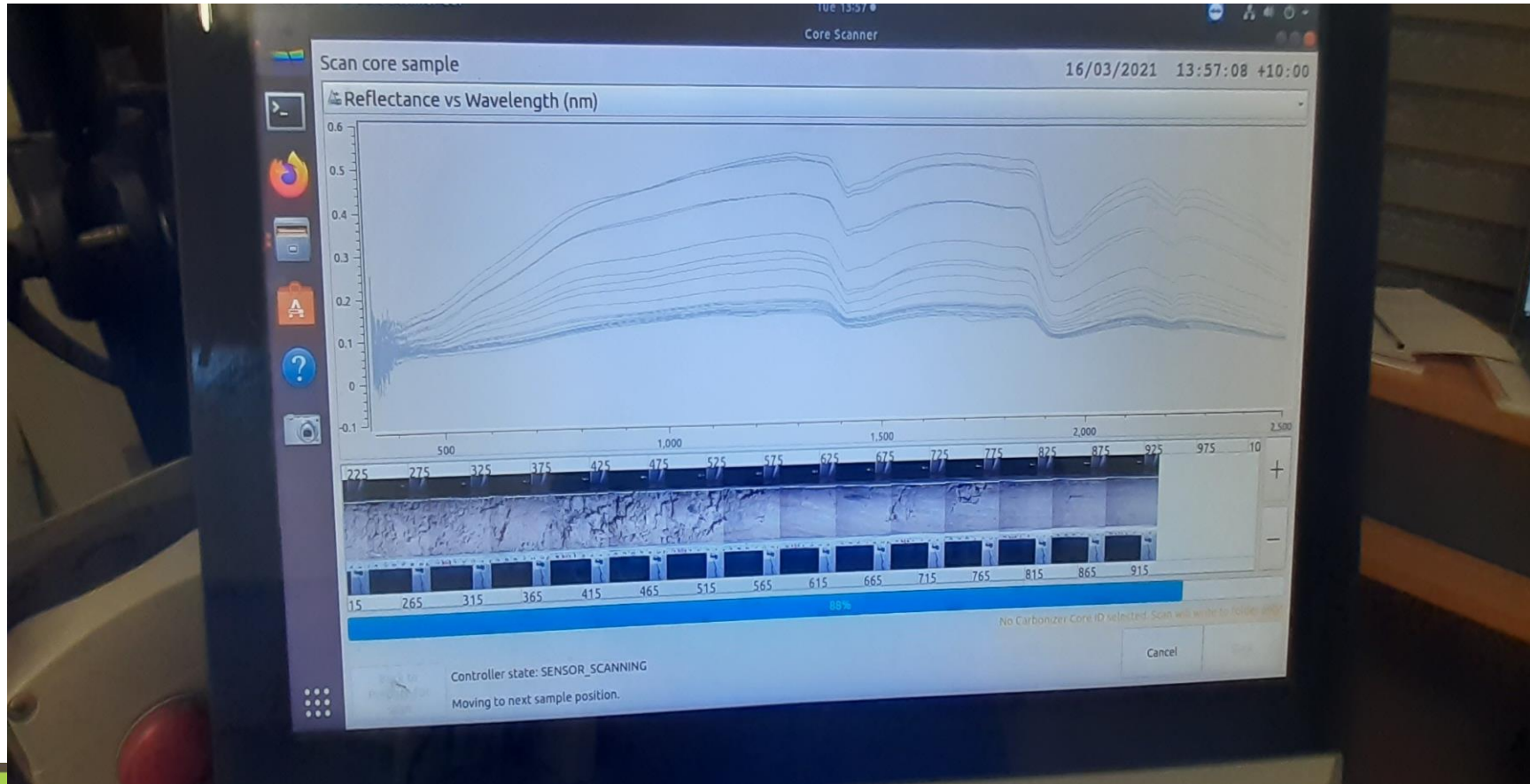


SCANS Unit – Soil Condition Analysis System Unit

A novel technology for measuring SOC (tC/ha)



NIR spectra and core photograph



The MAGIC PUDDING



1 tonne of Soil Organic Carbon
=
3.67 tonnes of Carbon Dioxide
For SALE



6. Will it be worth anything?



Key Drivers of Farm Return

1. Sequestration rate (tC/ha/year)



Projected outcomes at different sequestration rates

Sequestration rate (tC/ha/yr)	1.00	1.5	2
Projected net abatement (tCO _{2e})*	56400	84550	112750
Total cashflow over 25 years	\$1,660,900	\$2,608,000	\$3,555,100
Annualised cashflow per hectare	\$33	\$52	\$71
Net present value (25 years)	\$1,042,000	\$1,654,950	\$2,267,850
NPV discount rate	3.00%	3.00%	3.00%
Projected internal rate of return	39%	51%	60%

*Includes the mandatory risk of reversal and 25yr permanence discounts, as well as Carbon Link's commission on ACCUs (18%). Based on 2,000ha and a 25 year carbon price of A\$34/t CO_{2e}, with a cost base of A\$6/ha/annum.

Key Drivers of Farm Return

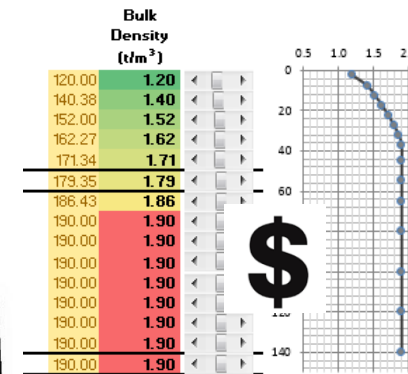
1. Sequestration rate
(tC/ha/year)



2. Price of
carbon (\$/T
CO₂e)



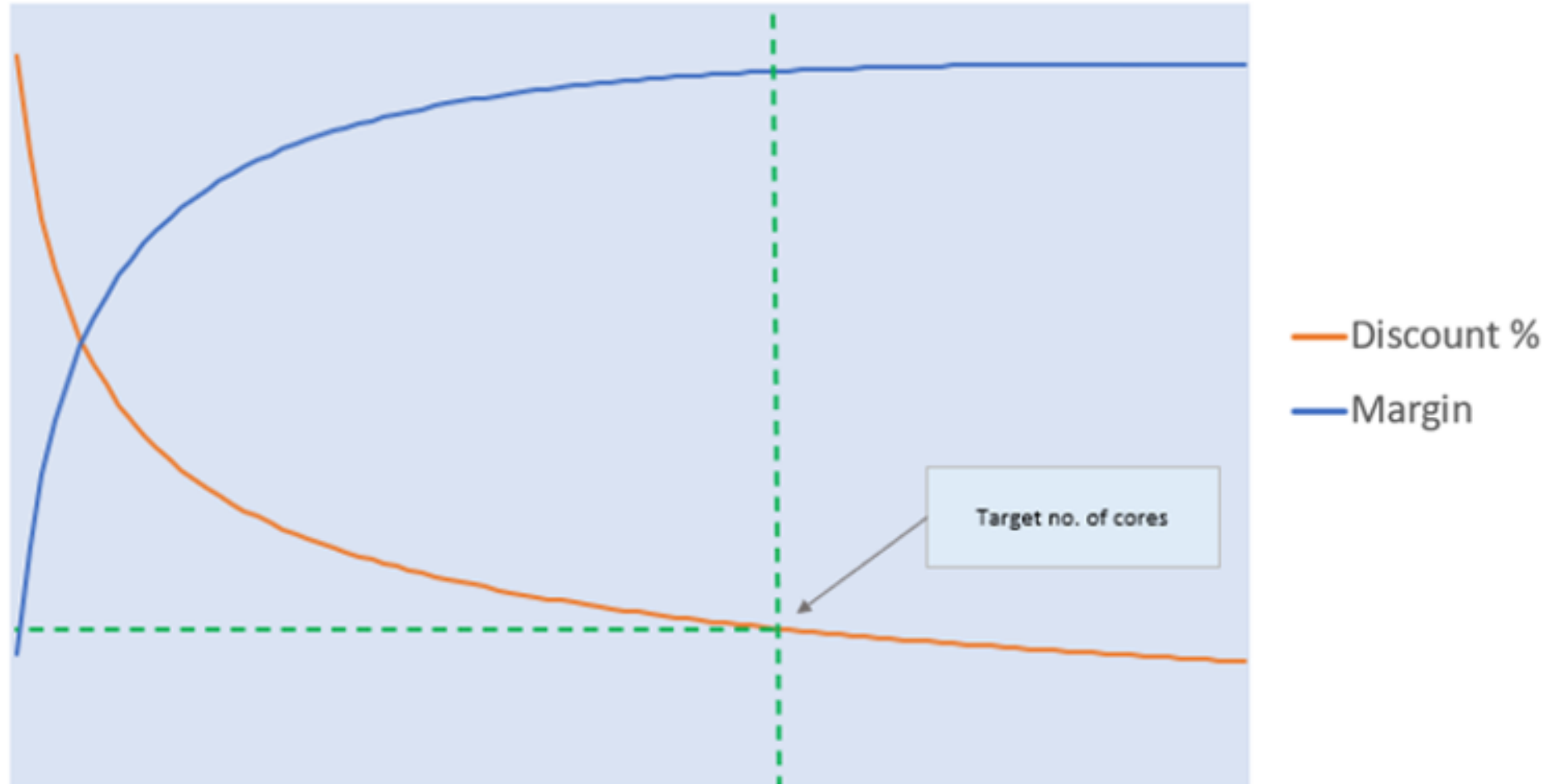
3. Cost of
measurement (\$/ha)



4. Scale of project
(ha)

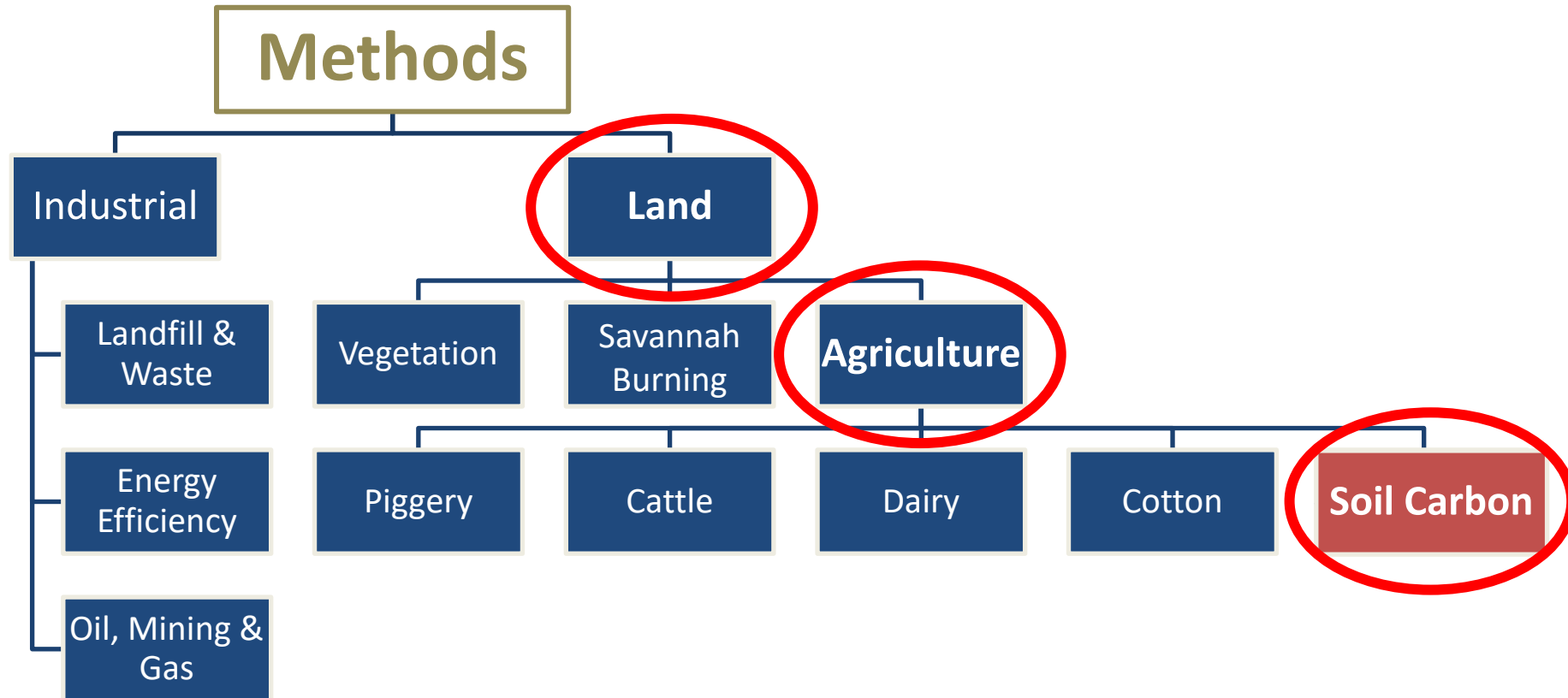


The Reason is Discounting on Variance



Accuracy increases as sampling intensity increases

7. Intro to the regulations





Carbon Farming

**CLEAN
ENERGY
REGULATOR**

Government body responsible for accelerating carbon abatement. Develops Methods & issues ACCUs.



**EMISSIONS
REDUCTION
FUND**

Australian Government fund to purchase low-cost carbon offsets to meet national targets.



**CARBON
PROJECT
METHODOLOGY**

Sets out the rules and requirements for a carbon project and generating ACCUs.

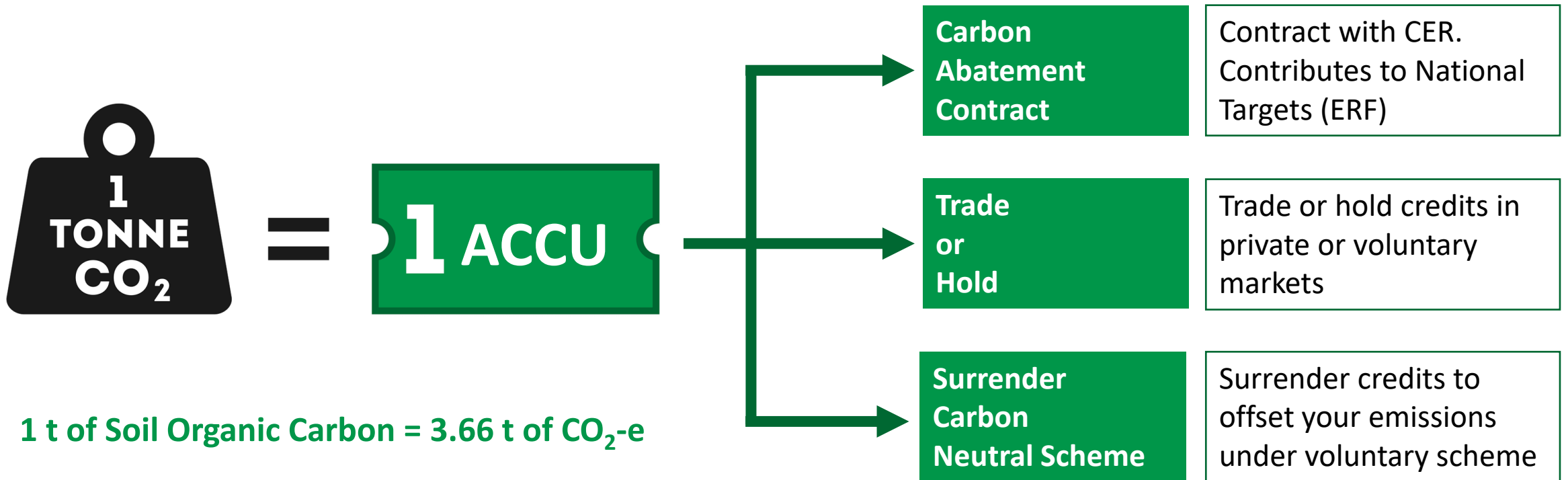


**AUSTRALIAN
CARBON CREDIT
UNIT**

Carbon Credits issued by CER to Project Proponent.
1 ACCU = 1 tonne CO₂-e



Australian Carbon Credit Unit (ACCU)



* ACCUs are a financial product, and some participants may require an Australian financial services licence to buy, sell and trade in the carbon market. You should seek qualified financial advice.

- Not all credits are created equally
- ERF provides genuine & additional abatement
- Backed by Australian Government





Why invest in a Carbon Project?

- The real focus should be to firstly focus on your business
- Soil carbon is an outcome from management practices
- Improve farm productivity and diversify returns
- Build business resilience and manage risk
- Improve natural ecosystems and biodiversity
- Drawdown emissions and contribute to emissions reduction targets

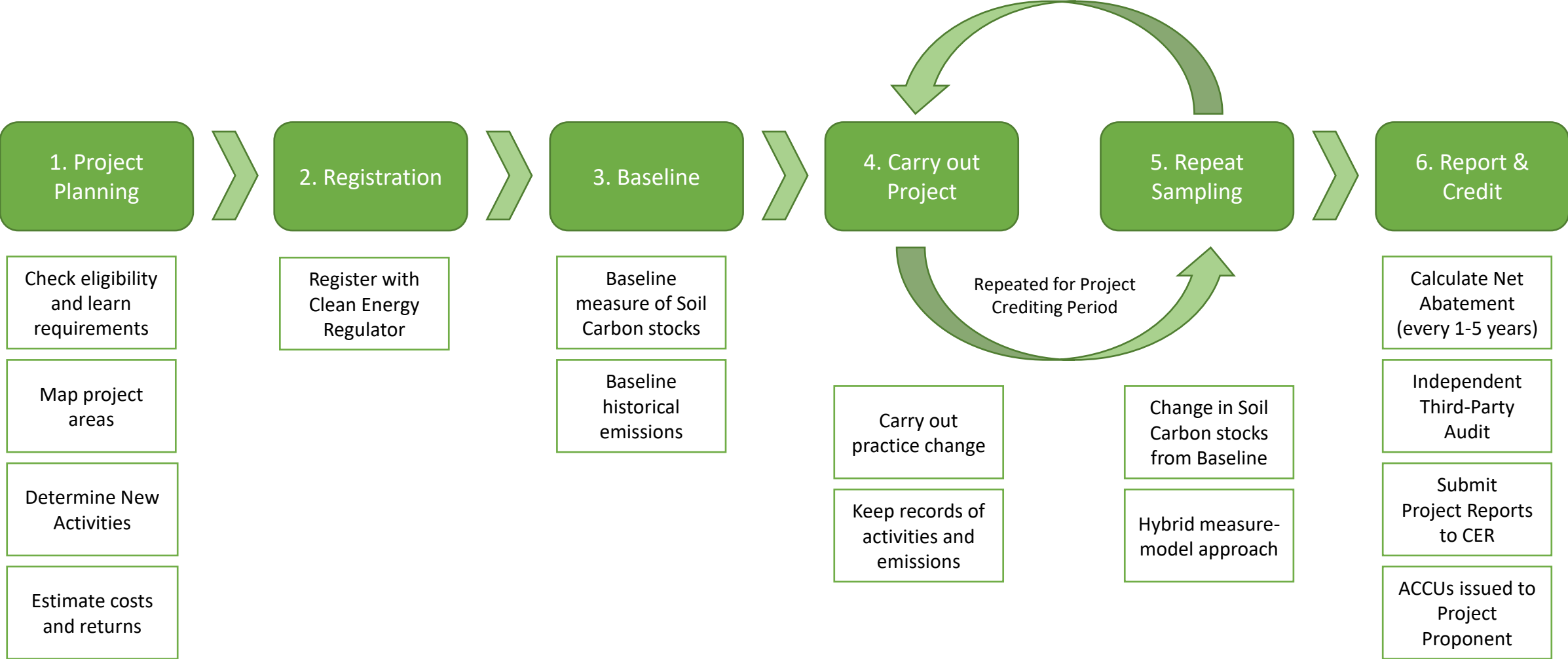
2021 Methodology Overview

Estimation of Soil Organic Carbon Sequestration using Measurement and Models

- **Register** with Clean Energy Regulator
- Implement a **New Activity** to improve soil carbon stocks
- Undertake **Sampling** of Project Area every 1-5 years
- **Monitor, Report & Audit** project activities and emissions
- Credits issued for increase in **Net Abatement** compared to **Baseline** (5 years)
- Carry on for 25-year or 100-year **Permanence Period**



Project Development Process





New Activity

- A **Practice Change** expected to increase SOC
- At least one activity must be carried out across all project areas
- Must be **New** or **Materially Different** to baseline activities
- Carried out until the end of the Permanence Period
- Can be changed over time
- Can start only after the project is registered



List of Eligible New Activities

- **Altering the stocking rate, duration or intensity of grazing**
- **Applying nutrients to the land (synthetic or non-synthetic fertilizer) to address a deficiency**
- **Plant legumes in a pasture or cropping systems**
- **Re-establishing or rejuvenating a pasture by seeding or pasture cropping**
- Applying lime, gypsum or ameliorants to remediate soil
- Undertaking new irrigation
- Establishing permanent pasture on cropland or bare fallow
- Retaining stubble after a crop harvest
- Converting to reduced or no till
- Modifying landscape features (e.g. erosion control)
- Add or redistribute soil through profile (e.g. clay delving)
- Planting cover crops

A photograph of two people riding horses through a dry, open landscape. The person on the left is wearing a plaid shirt and a wide-brimmed hat. The person on the right is wearing a light blue shirt and a wide-brimmed hat. The background shows sparse trees and a clear sky. A semi-transparent white circle is overlaid on the left side of the image, containing text.

Land Management Strategy

- Submitted with **registration** and **reviewed every 5 years**
- Details **practice change** being undertaken in project areas
- Addresses **risks and limitations** to sequestering carbon
- Outlines **mitigation strategies** if there is a reversal event
- Written by a **qualified person** with knowledge and experience in agronomy, plant nutrition and soils.

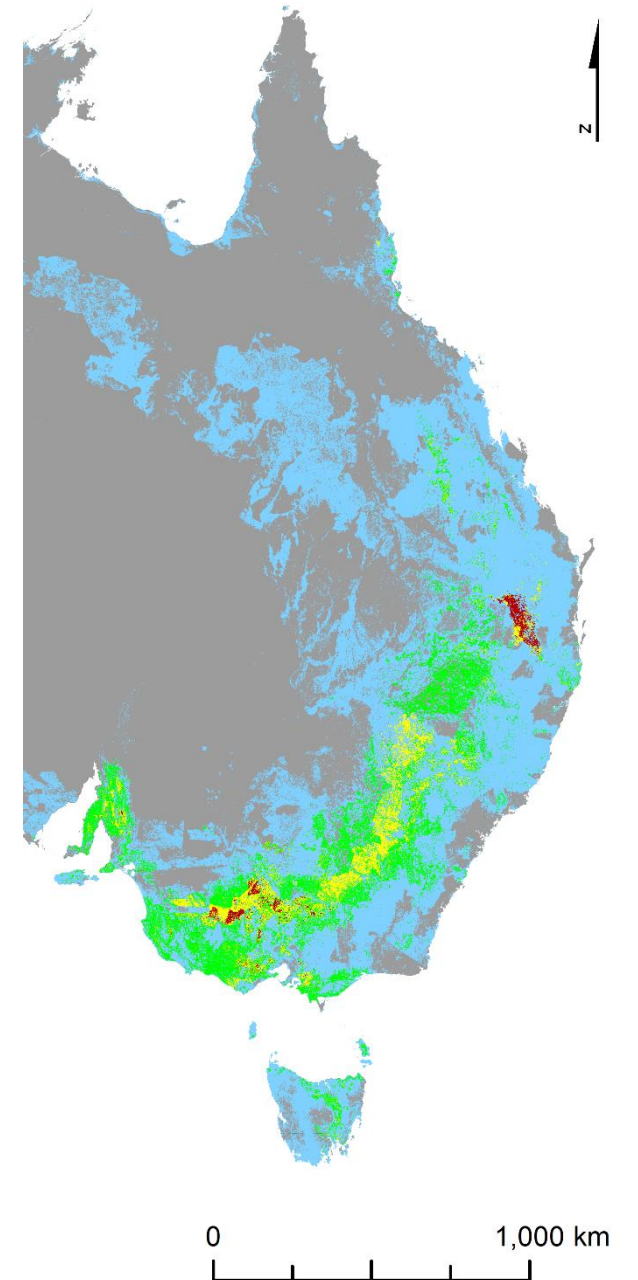
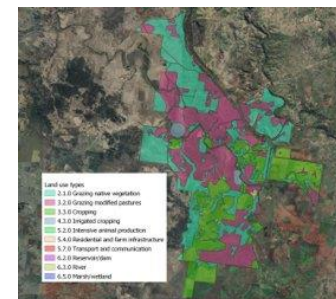
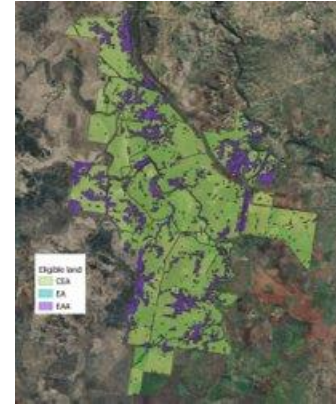


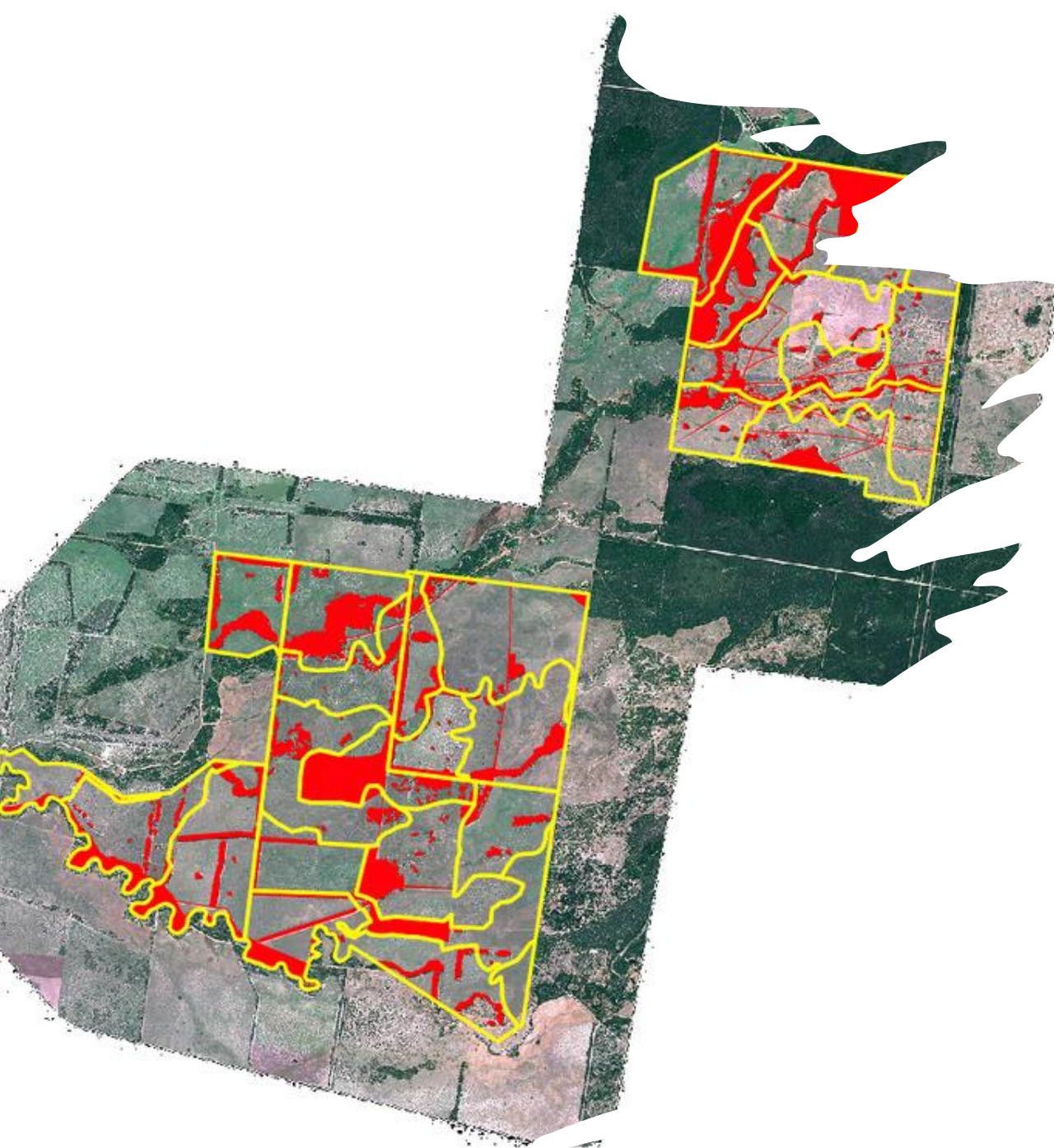
Excluded & Restricted Activities

- **Completely de-stocking a CEA**
 - Allowed only if you are converting to cropping, experiencing drought or have exceptional circumstances, e.g. disease outbreak among livestock
 - Okay if you are simply reducing numbers as part of management
- **Clearing & thinning**
 - Restrictions only apply to land that was forest cover during the baseline period
 - Management of horticulture crops, weeds and fire is allowed
- **Restricted non-synthetic fertilizers**
 - >5% OM and hasn't been sourced from within CEA / designated waste stream, or applied at a rate <100kg/ha/pa
- **Biochar application**
 - Must be sourced from within CEA or designated waste stream or applied at rate <100kg/ha
- **Irrigation**
 - Limit of ~20% increase for existing irrigation compared to baseline

Eligible Project Area

- Used for pasture, cropping or bare fallow during the baseline period
- Physically able to be sampled
- Classify forest area
- Consider sequestration potential & practice change



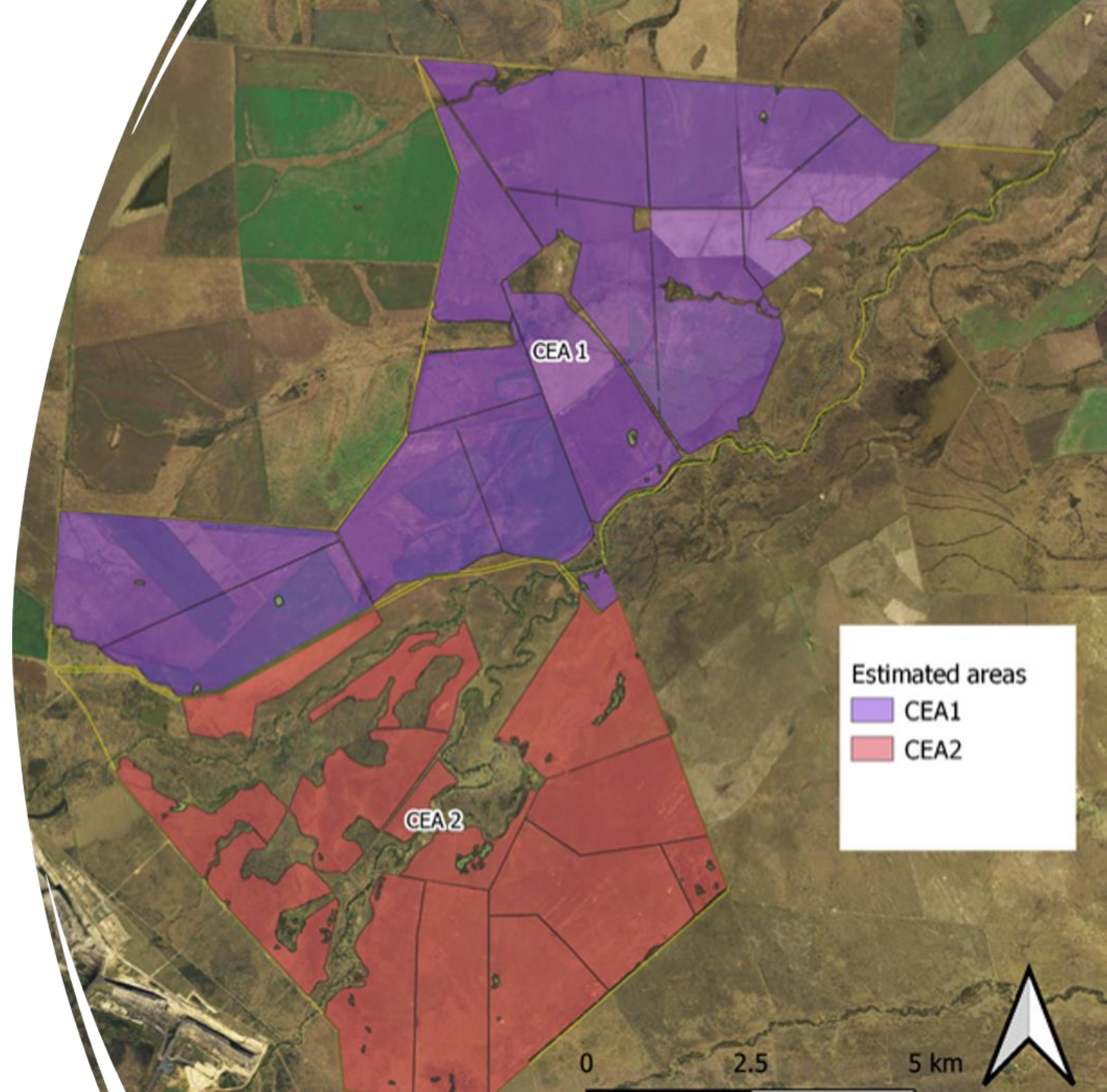


Excluded & Ineligible Areas

- Roads, buildings, dams, infrastructure etc.
- Areas where there's no practice change
- Areas that can't physically be accessed or measured
- Forest areas that weren't farmed or grazed during the baseline period
- Areas cleared in baseline period or cleared illegally
- Drained wetlands
- Organosols (peat land)

Carbon Estimation Area (CEA)

- Project Area divided into Carbon Estimation Areas
- Area where activities are undertaken, and carbon stock is measured
- Based on soil type, land use and practice change
- Fixed for duration of the project

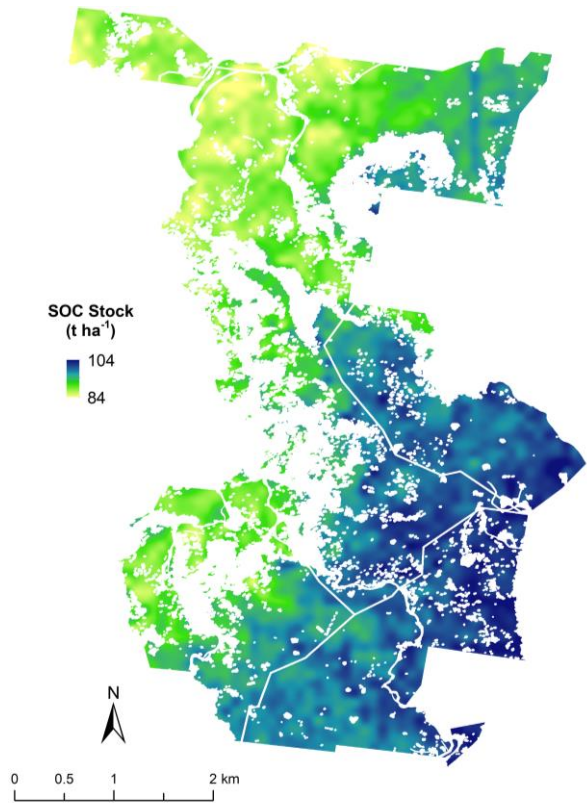




- Project Proponent details
- Project Area Maps
- Eligible Interest Holder Consent*
 - Mortgagees / Lessor / Banks
 - Native Title
 - Crown Land
- Land Management Strategy
- Evidence that land is eligible land
- Forward abatement estimate

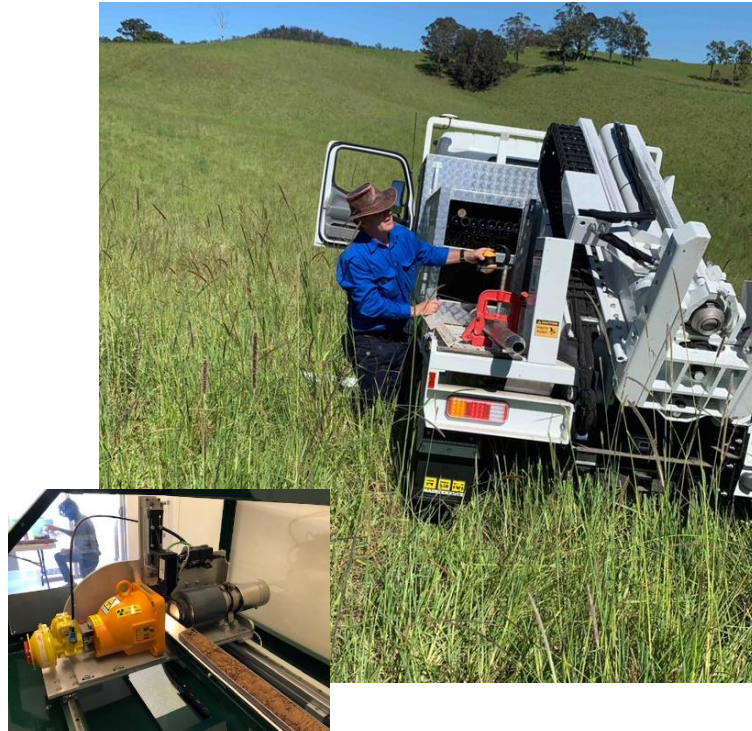
* EHC not required until end of first reporting period

Hybrid approach using Measurement and Models



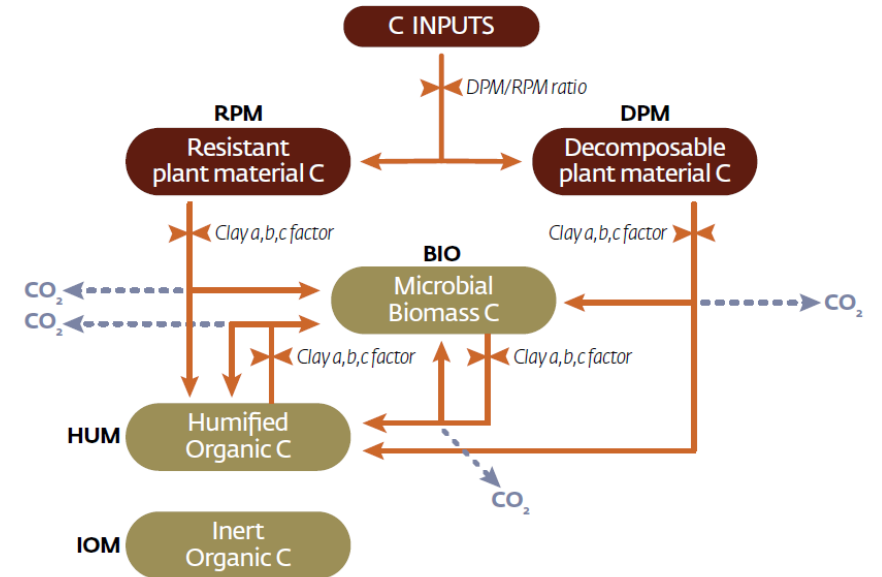
Remote Sensing

Targeted sampling to reduce cost and improve accuracy



Direct Measurement

Reduced cost using sensors, real measurement to support modelling

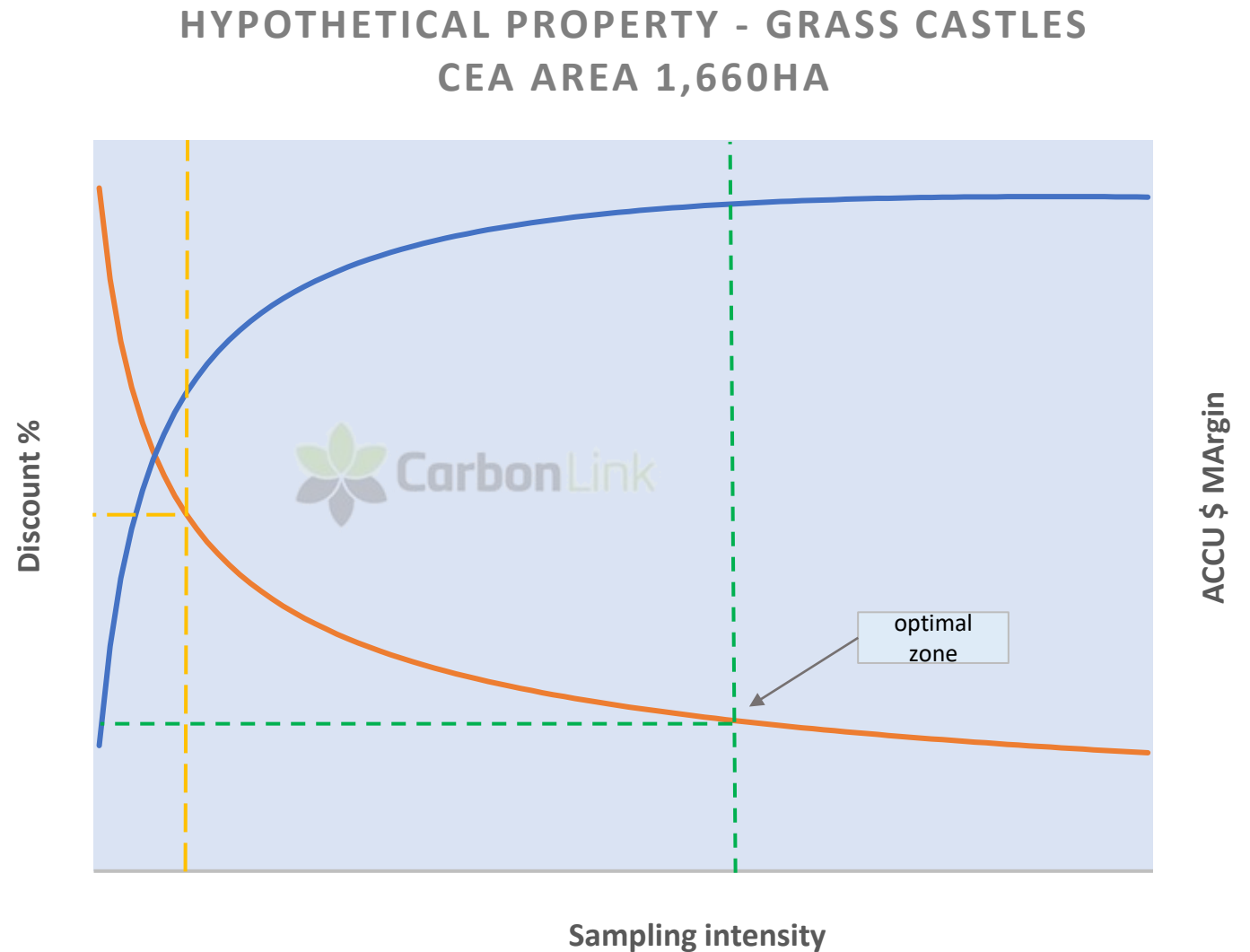


Modelling

Increased certainty and reduced payback period

Sampling Plan – why it matters

- Discounts are applied to carbon stocks based on certainty of the measurement or model
- Insufficient sampling (intensity or location) can result in high uncertainty
- The higher the uncertainty, the less ACCUs that may be credited
- Future project performance can be impeded if you have a poor baseline
- The initial costs may be higher, but overall project returns are greater





Emissions sources

Increases in emissions above baseline levels are subtracted from Net Abatement calculation

- Livestock (head, class, duration in project area)
- Synthetic fertilizer application (nitrogen, urea)
- Lime application
- Crop residues and tillage
- Pasture renovation
- Landscape modification
- Irrigation energy (fuel and electricity)
- Biochar application

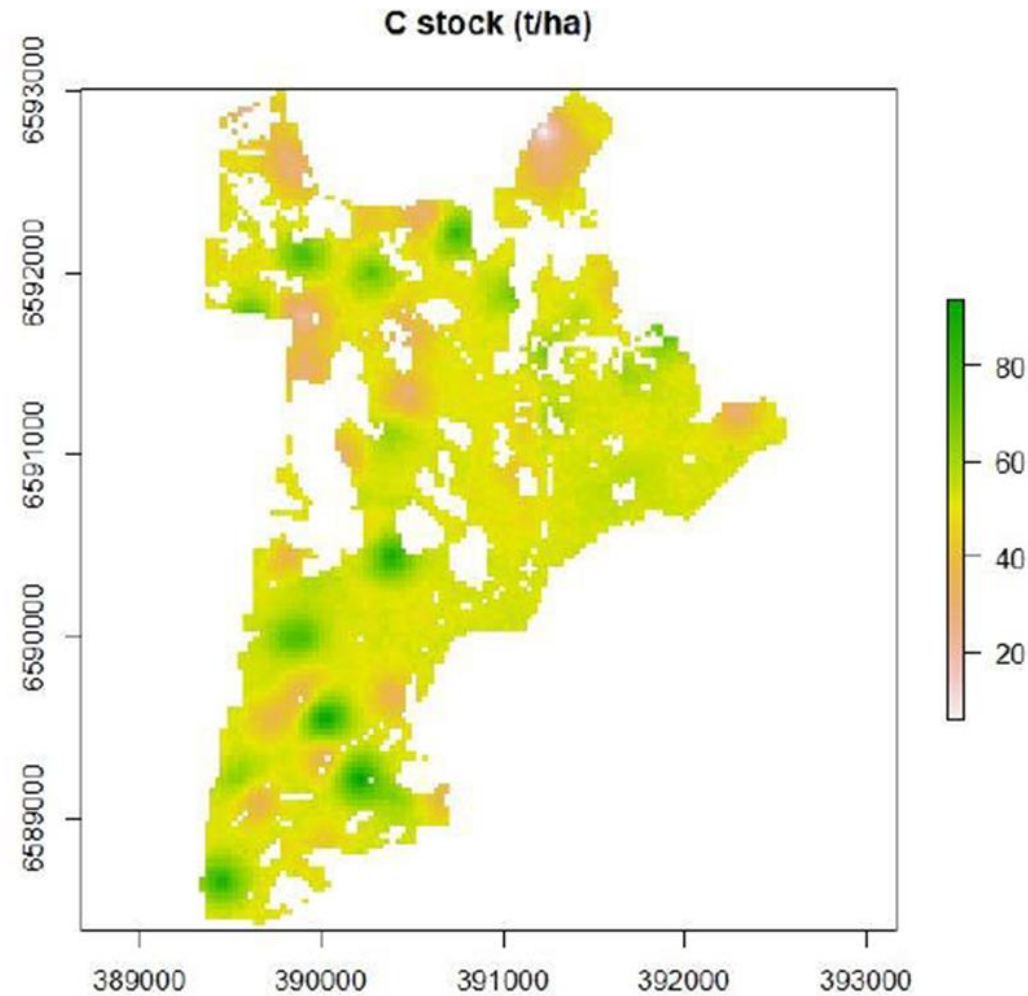
Records and Reporting

- Records of activities and emissions from baseline period
- Evidence of new activity implementation
- Evidence of emissions during project
- Changes to Land Management Strategy
- Disturbance or Reversal Event
- Changes to Project Area or Proponent
- Offset and Audit Reports



8. Case Studies

ESTIMATED DISTRIBUTION of TOTAL SOIL ORGANIC CARBON STOCK (0-30cm)





What is natural capital?

- **The world's stocks of natural assets which include geology, soil, air, water and all living things.**
- **It is from this natural capital that humans derive a wide range of services, often called ecosystem services, which make human life possible.**





RCS Farm Portrait™

Telling the story of great
farm stewardship





Natural capital valuations help to:



**Solve
sustainability
challenges**



**Build trust
with
customers**



**Transition
supply
chains to
improved
outcomes**



**Manage
strategic
risks**



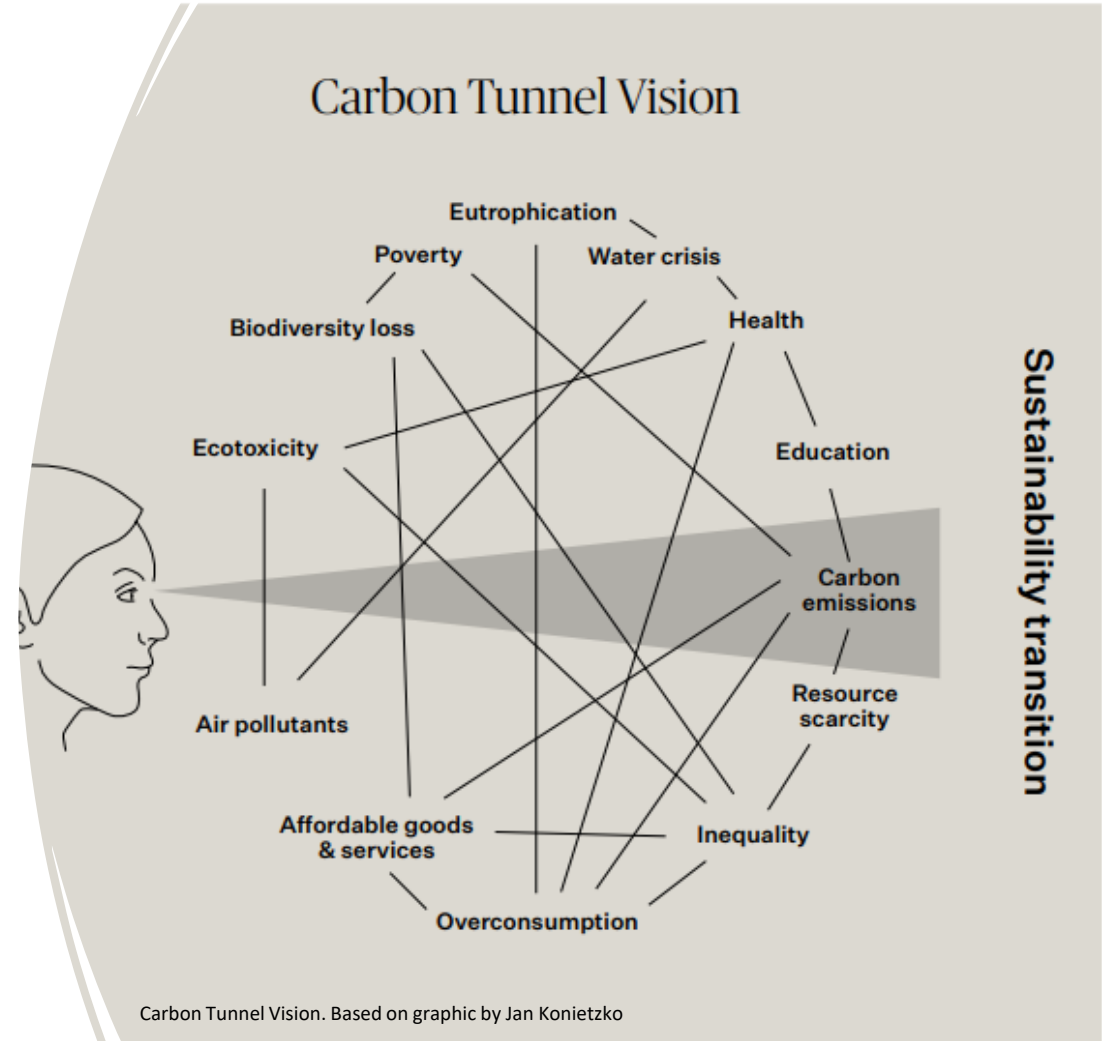
**Recognise &
reward
performance**



Questioning..... Everything.....

- Method Development – Regulatory or Market Based?
- Measurement – Indicators, quantification and then what?
- Scientific Rigour – Farmer through to Guru, what matters?
- Government dependency?
- So, what about payments? (*Co-benefits – LRF, other markets*)
- What about the ‘*Systems Dynamics*’? Avoiding ‘*Carbon Tunnel Vision*’

The big opportunity for farmers to receive payments for management of natural capital;
Regenerative Ag Principles to drive Soil Carbon sequestration





Farm Portrait operates through the RCS four pillars:

People measures

- Clarity
- Continual growth
- Wellbeing

- Community
- Culture & reconciliation



Business measures

- Profitability

- Effectiveness

- Efficiency



Production measures

- Enterprise analysis

- Enterprise effectiveness

- Enterprise suitability



Land measures

- Soil Health

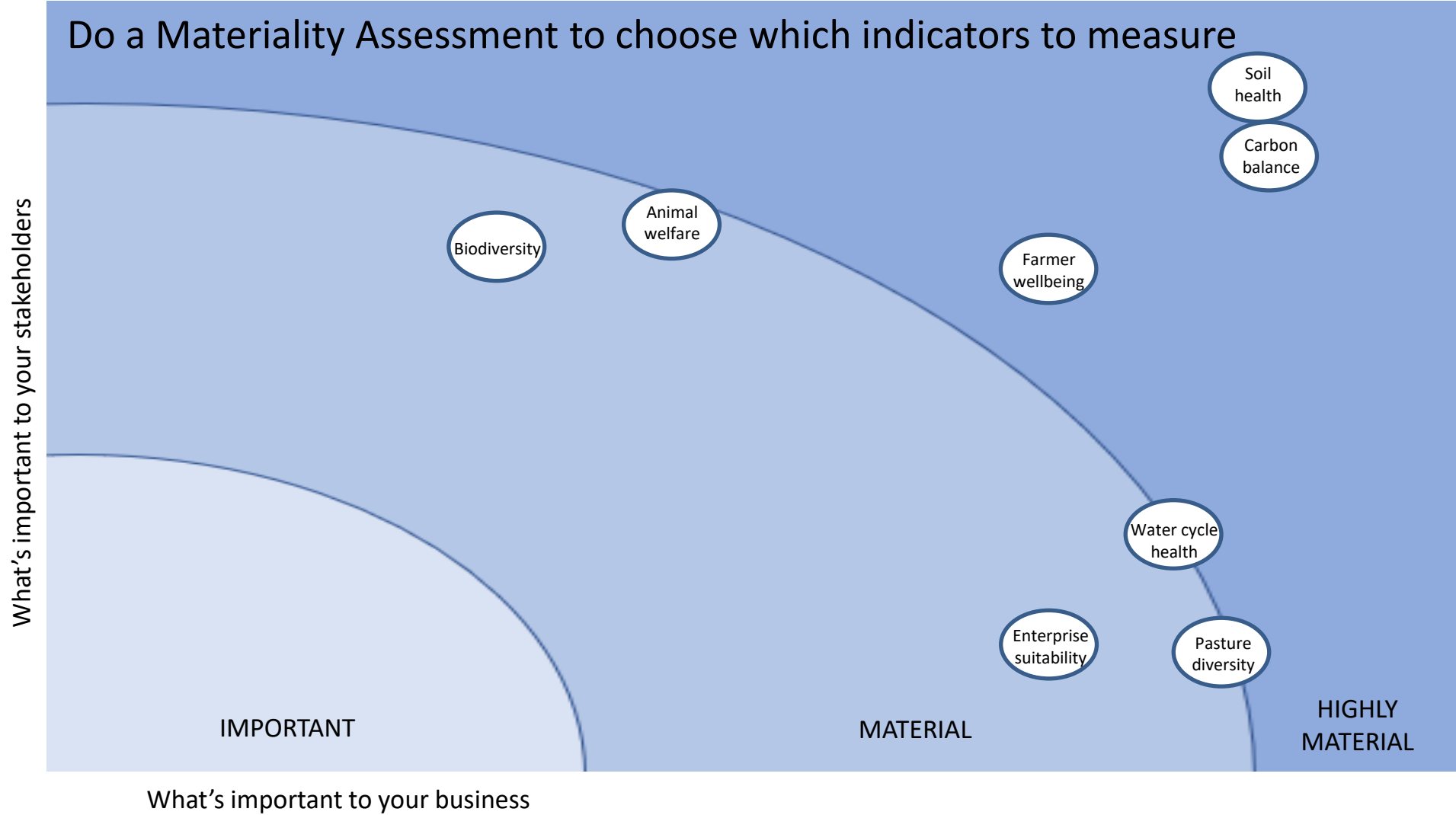
- Biodiversity

- Water cycle health





Do a Materiality Assessment to choose which indicators to measure





Who wants 'Farm Portraits'?

Producers

- To track their amazing outcomes & be ready to take advantage of emerging markets
- To share their story
- To demonstrate their contribution to

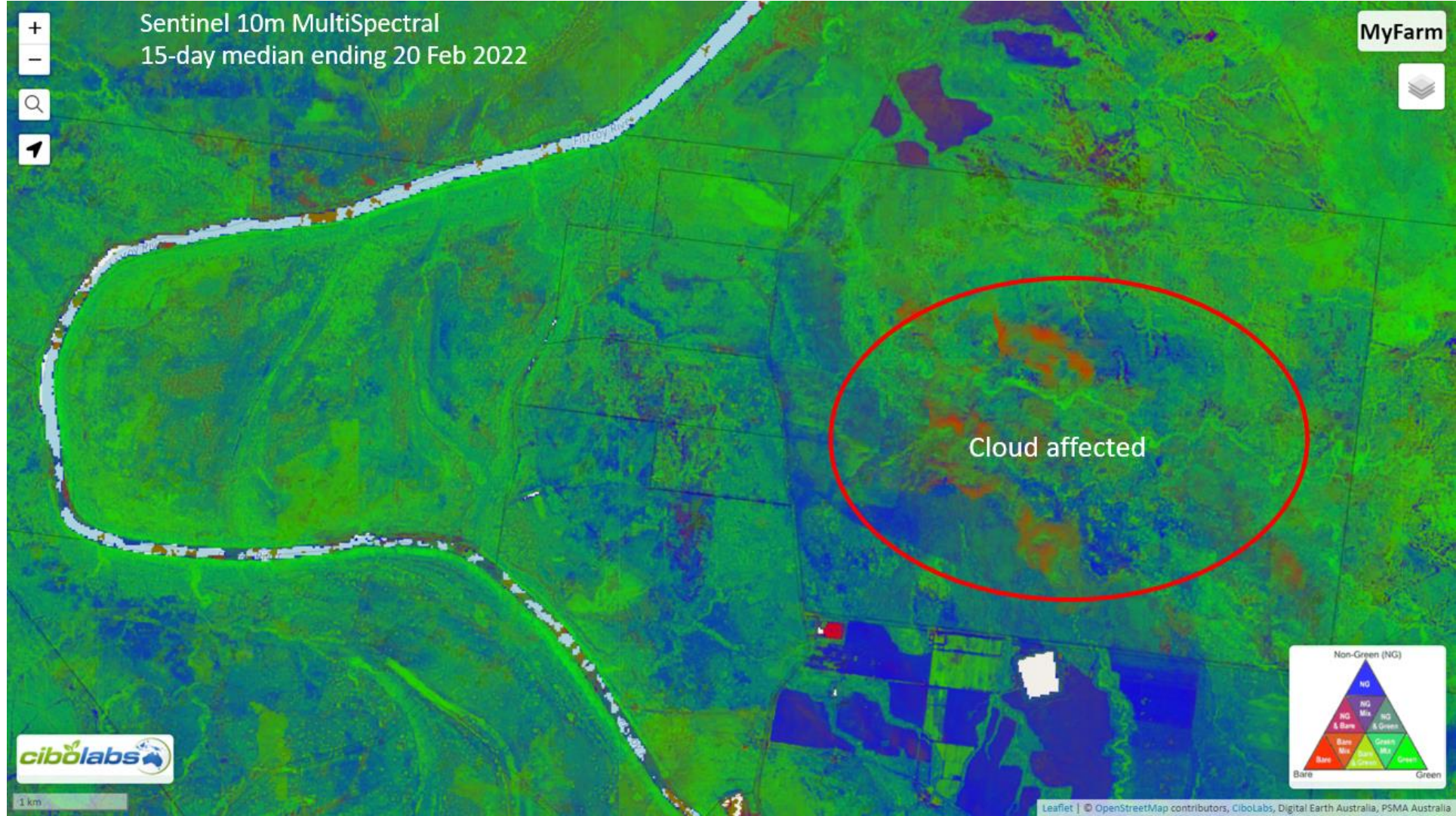
)

Bankers & Investors

1. Mainstream banks and investors who want to demonstrate their investments are environmentally and socially responsible
2. Investment groups that seek to offer niche investment opportunities that return environmental & social benefits as well as financial

Value Chains

1. Mainstream supply chain actors who want to demonstrate their supply is environmentally and socially responsible
2. Niche supply chain actors who seek to offer food & fibre products that do good for people and planet

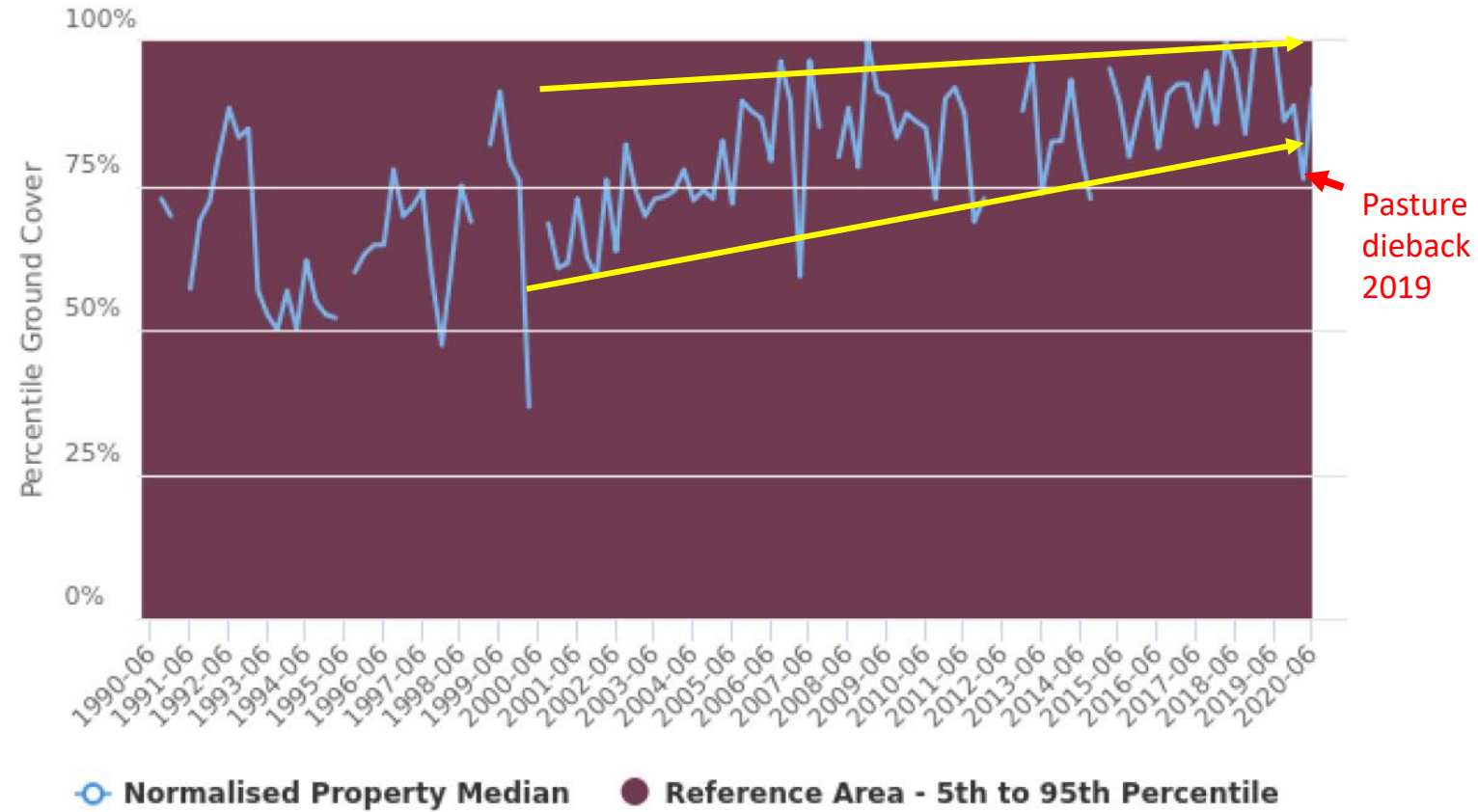




Moora Plains Ground Cover – benchmarked



Normalised Benchmark





Ground truthing is essential!





Moora Plains

Biodiversity baseline 2020

Biodiversity recorded:

- 148 species of native plants
- 72 species of native animals

Key species and habitats of conservation interest:

- squatter pigeon (Econd: 53)
- gilgai and frontage wetlands (Econd: 63)
- brigalow (TEC) & poplar box on alluvials (TEC) (Econd: 63)
- koala habitat (Econd: 23)

2020 Accounting for Nature overall score: 47

Econd: a normalised score /100 for an environmental asset under Accounting for Nature
TEC: nationally Threatened Ecological Community



Vulnerable to extinction:
Squatter pigeon (*Geophaps scripta scripta*) Moora Plains



Moora Plains
Riparian
Condition
Assessment

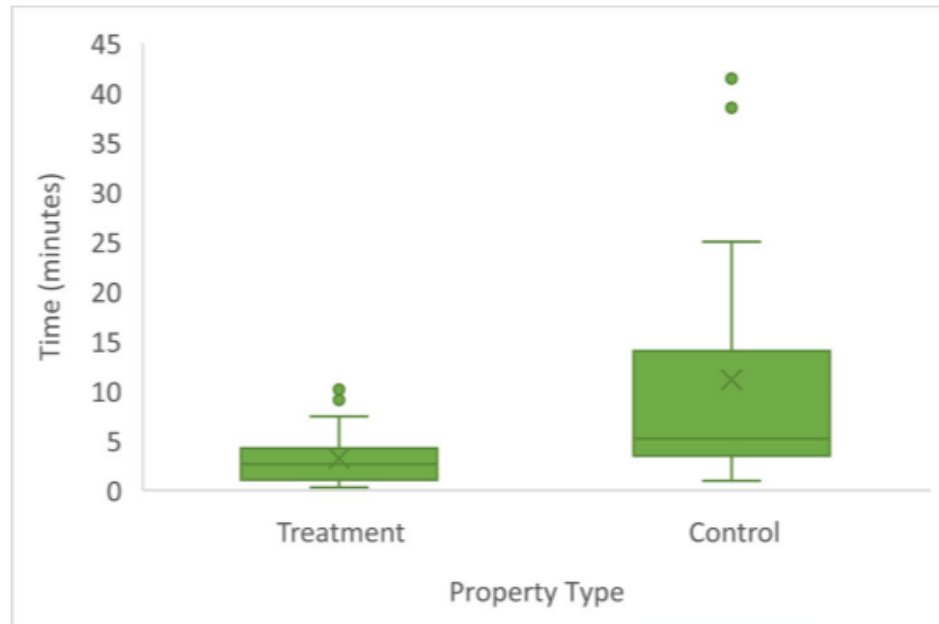
**Average
AUSRIVAS score:
156/200**

**Average Rapid
Appraisal of
Riparian Condition
score: 36.3/50**





Moora Plains water infiltration rates 2019 & 2020:



Treatment: Moora Plains
Control: neighbouring properties





Cell grazing system, Uralla, NSW.



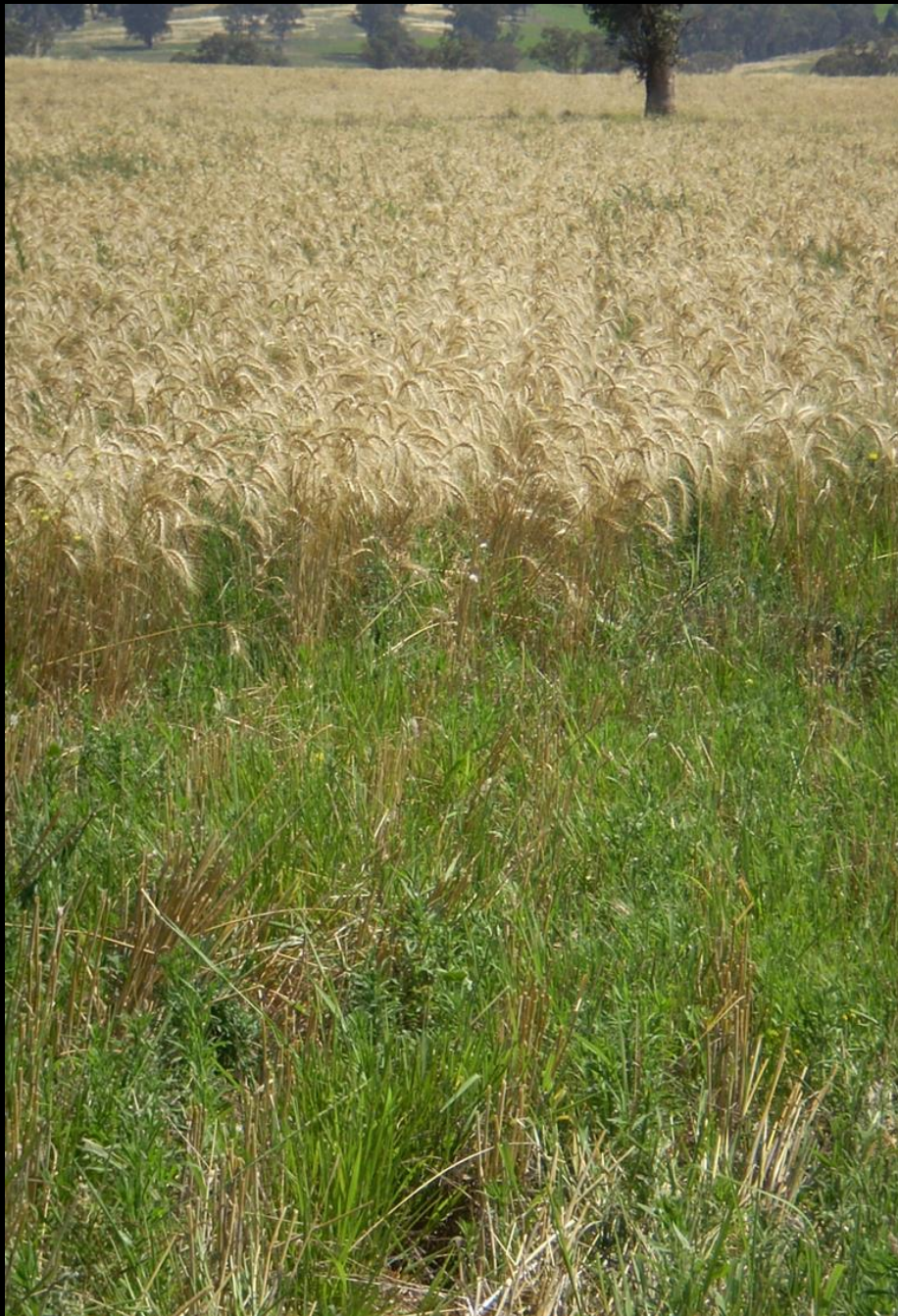


9. Practice Change

In **NATURE** there are
no **REWARDS** or
PUNISHMENT, only
CONSEQUENCES

Robert Ingersoll (1833 – 1899)

**Spiral
up**



**Spiral
down**



Ways to increase soil health



Biodiversity

CATALYTIC
INPUTS

BIOLOGY

MANAGEMENT

(eg grazing/cover cropping)





Tools available

Management

- **Grazing System**
- **Cover/Green manure Crops**
- **Crop rotations**
- **Continuous cropping**
- **Aeration**
- **Landscape Hydration**

+ Biology

- **Compost & Compost Extract (BEAM)**

+ Fertilizer & Catalysts

+ Biodiversity



GRAZING PRINCIPLES

1. **PEOPLE**
PLAN, MONITOR & MANAGE
2. ADJUST REST TO SUIT PLANT GROWTH
3. **ECOSYSTEM**
MATCH STOCKING RATE to CARRYING CAPACITY
4. **BUSINESS \$\$\$**
MANAGE LIVESTOCK EFFECTIVELY
5. MAXIMUM STOCK DENSITY for MINIMUM TIME
ECOSYSTEM & \$\$\$
6. MANAGE for BIODIVERSITY



Multi Species cover crops



Images by Myles Ballentine



Cover Crop Termination

Roller crimping & sowing



Green Manuring & Machine Incorporation



Aeration & Rehydration - Keyline





Hydration

Mulloon Institute



Swales



Gully Repair



Leaky Weir



Soil health principles, drivers and outcomes

PRINCIPLE	DRIVER	OUTCOMES
1. Plan, monitor and manage soil health	People	<ul style="list-style-type: none">• Clear direction• Understand purpose• Managed change
Maximise photosynthetic capacity and capture	Sunlight	<ul style="list-style-type: none">• Max root biomass and exudates• Stimulate biology• Build soil carbon
Balance soil biology, plant nutrition and soil structure	Balance	<ul style="list-style-type: none">• Increased water holding capacity• Increased nutrient access and production• More effective photosynthesis
Introduce and foster biodiversity	Biology	<ul style="list-style-type: none">• Increased system resilience• Ensure functional redundancy• Ensure functionality
Optimise soil surface protection	Cover	<ul style="list-style-type: none">• Buffers soil temp• Protect biology, structure and moisture• Reduce erosion and weeds
Incorporate livestock	Recycling	<ul style="list-style-type: none">• Break down cellulose and recycle minerals• Increase biological diversity• Increase plant availability of nutrients.



Planning





The Soil Food Web



First trophic level:
Photosynthesizers

Second trophic level:
Decomposing Mutualists
Pathogens, Parasites
Root-feeders

Third trophic level:
Shredders
Predators
Grazers

Fourth trophic level:
Higher level predators

Fifth & higher trophic level:
Higher level predators



WHAT about energy flow?

Mechanical Mind CONSEQUENCE

- Photosynthetic CAPACITY measured at 10 to 15% in Industrial Agriculture.

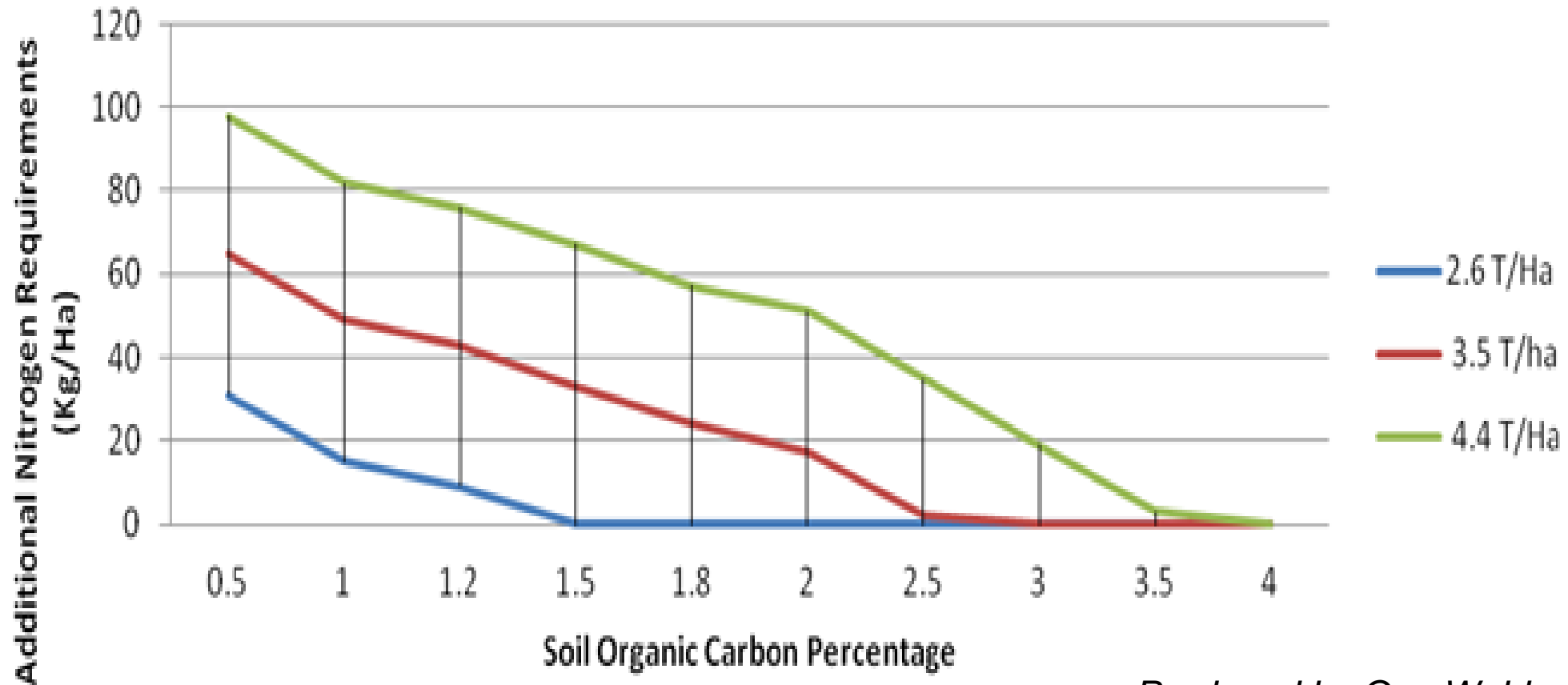
Emergent Mind CONSEQUENCE

- Photosynthetic CAPACITY measured at 56% in BEAM Crops and in irrigated pasture.
- Nett PRIMARY PRODUCTION up 5
fold



Carbon v Nitrogen

Additional Nitrogen Requirements at Varying Wheat Yield Targets and Organic Carbon Percentages



Produced by Guy Webb

