Accounting for Nature®

Guidelines for Pcond

Soil Condition Accounts

Version 1.1

VERSION CONTROL

***Accounting for Nature*® Guidelines for Pcond – Soil Condition Accounts Version 1.1 (February 2021)**

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Summary

A number of landholders have expressed the desire to be able to understand the differences (both trade-offs and co-benefits) between production and conservation outcomes in agricultural soils used for horticulture and cropping, and native grasslands in grazing land.

To facilitate this, Accounting for Nature has developed the option for landholders to include a production condition index (called a Pcond) alongside their environmental condition index (the Econd) in their Soil Condition Accounts. In all cases the Pcond must be accompanied with an Econd™.

1. Introduction

AfN understands that many Proponents (particularly in the horticulture and regenerative farming sector) wish to measure and report not just on the environmental condition of soils, but also on the production benefits that sustainable farming provides. To facilitate this, alongside the submission of an Econd™, Proponents may also elect to include an **optional** Production Condition Index (a Pcond) for soil in their Environmental Condition Account.

2. What is a Pcond?

The Pcond (or Production Condition) index describes the condition of a biophysical asset relating to its potential to produce a defined set of goods or services. The Pcond can be applied to describe the condition of agricultural (horticulture and cropping) soils, as well as native vegetation condition in grazing land.

While the Pcond serves a different purpose to the Econd™, it generally aligns with the AfN framework in that it assesses the condition of an asset relative to a Reference Benchmark through the measurement of indicators to produce a readily understandable index on a scale of 0 to 100.

The key difference between the Econd™ and the Pcond, is that the **Reference Benchmarks of the Pcond** are based on the maximum potential of the soil (or native vegetation) to produce food and fibre (and how this information is able to optimise farm production), while the **Reference Benchmarks of the Econd™** are based on an "undegraded" condition. Quite often, particularly for soil in horticulture or cropping land, the same indicators would be used to generate both the Econd™ and Pcond scores.

Figure 1 shows how the Pcond and Econd™ values and trajectories can differ for a single site, in this example for the soil assets on cropping land in western Victoria.

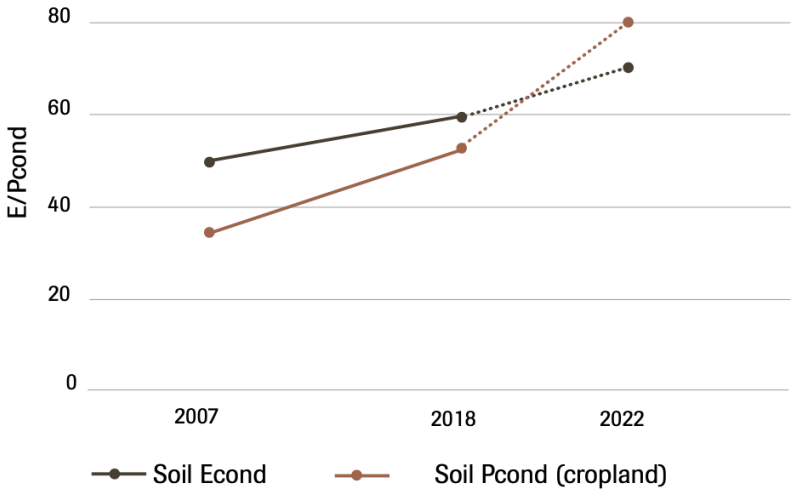

Figure 1. Soil Econd™, Pcond and trajectories 2007-2018, and projected to 2022 (Source: Figure 6 from the Kilter Rural FFL Winlaton Environmental Account Summary 2018)

3. When is a Pcond required?

Under the AfN Framework, while the Econd™ **must** be included for the purpose of certification of Soil Condition Accounts ('Soil Accounts'), a Pcond is an **optional** inclusion where productive land (i.e. cropping or grazing) is involved. In all cases, where a Pcond is included, an Econd™ must also be included. This is because AfN is fundamentally focussed on the environmental condition of assets. However, by calculating both an Econd™ and Pcond for productive areas, it highlights the positive environmental co-benefits and/or trade-offs of improving soils for productive purposes.

Figure 2, below, summarises the requirements for where an Econd™ and Pcond, must be included. In summary, if opting to include a Pcond, productive areas (cropping and grazing) must produce both an Econd™ and Pcond, whereas the non-productive areas (natural areas) are only required to produce an Econd™.

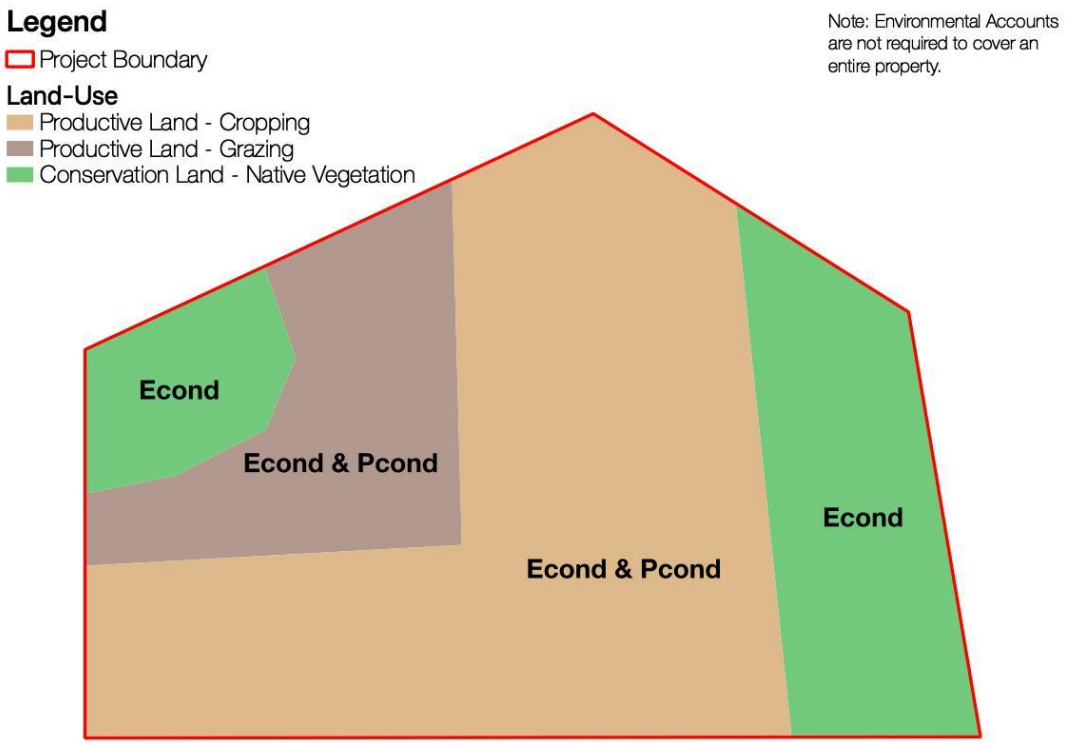

Figure 2. Overview of where Econd™ and Pconds can be used within accounting areas that contain productive land

4. How to calculate a soil Pcond

If a Proponent wishes to include a Pcond alongside their Econd™ in a Soil Account, they must utilise an **AfN approved Method** which includes details on how the Pcond is to be calculated, including guidance on determining the Reference Benchmarks.

The key difference between the Soil Econd™ and the Soil Pcond, is that the **Reference Benchmarks of the Pcond** are based on the maximum potential of soil to produce a specific type of food or fibre (and how this information is able to optimise farm production), while the **Reference Benchmarks of the Econd™** are based on their natural "undegraded" condition.

5. The soil Pcond

In general, the same soil indicators would be used to generate both the Econd™ and Pcond scores. Most of the time the Reference Benchmark for the Econd™ and Pcond would be different. For example, the Reference Benchmark for Phosphorus concentration would generally be extremely low for the Econd™ as Australian soils are naturally deficient in P, while the Reference Benchmark of P for the Pcond would be higher, as most cropping plants require higher concentrations of P. Occasionally the Reference Benchmark might be the same for both the Econd™ and Pcond (for example saline soils can be equally detrimental for both natural

and cropping soils, however again, this isn't always the case as some Australian soils are naturally saline).

In a Soil Condition Account, the Reference Benchmarks are used to calculate the Indicator Condition Scores for each soil indicator measured. The Indicator Condition Scores are then aggregated (usually by area weighted averages) to calculate the overall Econd™ and Pcond.

Table *1*, shows an example of indicator scoring for four common soil indicators: Soil Physical Integrity, Soil Carbon, Soil Salinity, and Soil pH. It should be noted that nutrients, particularly phosphorus, are not included in this example, but are required to be included as an indicator for soil condition accounts. In this example, the values associated with an Indicator Condition Score of 100 represents the Reference Benchmark range for that indicator. Figure *3*, shows a comparison of the Econd™ and Pcond Indicator Condition Scores for different soil types, as well as the overall Econd™ and Pconds, while Figure 4 shows the difference in ICS for Econd™ and Pcond calculations (the difference is calculated as Econd™ value minus Pcond value).

The Method to produce the Soil Condition Account, will either include the specific Reference Benchmark values for calculating the Pcond or will include instructions on how to determine the Reference Benchmark values for the Pconds. In general, the Reference Benchmarks can be determined through:

- Published values (i.e. in peer reviewed journals); or,
- Expert opinion.

It is noted that different crops may have different soil attribute requirements, and therefore, some Methods may prescribe different types of Pconds, which may include:

- a general 'Pcond that represents the ideal soil condition for general cropping or grazing activities (similar to that shown in Table 1); or,
- a specific Pcond that represents the ideal soil condition for a specific production system or crop type that requires specific soil attributes. For example, to grow pineapples relatively pest free in Queensland, the soil needs to be more acidic than what is considered ideal for other cropping systems. There are a number of other crops that may have specific soil requirements and therefore require more specific Reference Benchmark values.

The 'purpose' of an account must describe the types of production system (i.e. specific crops) and what the Reference Benchmark for the Pcond is to be based on (i.e. if it is general or specific). If the production system changes on a piece of land, then the account developer can change the Reference Benchmark values to suit the new production system, and hindcast the account using the new Production System.

Table 1. Summary of Indicator Condition Scoring (where an ICS of 100 represents the Reference Benchmark range). Source: Kilter Rural FFL Winlaton Environmental Account 2018

Soil Physical Integrity (Emerson Scores)				
	Econd™ Range			Pcond Range
ICS	Black Cracking Clay	Grey Cracking Clay	Loamy Medium Clay	All Soil Types
0	0-5			
20	5-15			
40	15-25			
60	25-35			
80	35-45			
100	**>45**			
Soil Carbon (% Total Carbon)				
	Econd™ Range			Pcond Range
ICS	Black Cracking Clay	Grey Cracking Clay	Loamy Medium Clay	All Soil Types
0	0-0.5	0-0.25	0-0.1	0-1
20	0.5-1	0.25-0.75	0.1-0.5	1-1.5
40	1-1.5	0.75-1.25	0.5-1	1.5-2
60	1.5-2	1.25-1.75	1-1.5	2-2.5
80	2-3	1.75-2.75	1.5-2.5	2.5-3.5
100	**>3**	**>2.75**	**>2.5**	**>3.5**
Soil Salinity (dS/m)				
ICS	Econd™ Range			Pcond Range
	Black Cracking Clay	Grey Cracking Clay	Loamy Medium Clay	All Soil Types
0	>16			
20	10-16			
40	6-10			
60	4-6			
80	2-4			
100	**0-2**			
Soil Acidifcation (pH in H_20)				
ICS	Econd™ Range			Pcond Range
	Black Cracking Clay	Grey Cracking Clay	Loamy Medium Clay	All Soil Types
0	0-4.5		0-5	0-4
20	4.5-5.5		5-6	4-5
40	5.5-6		6-6.5	5-5.5
60	6-6.5		6.5-7	5.5-6
80	6.5-7		7-7.5	6-6.5
100	**7-7.5**		**7.5-8**	**6.5-7**
80	7.5-8		8-8.5	7-7.5
60	8-8.5		8.5-9	7.5-8
40	8.5-9		9-9.5	8-8.5
20	9-10		9.5-10.5	8.5-9.5
0	>10		>10.5	>9.5

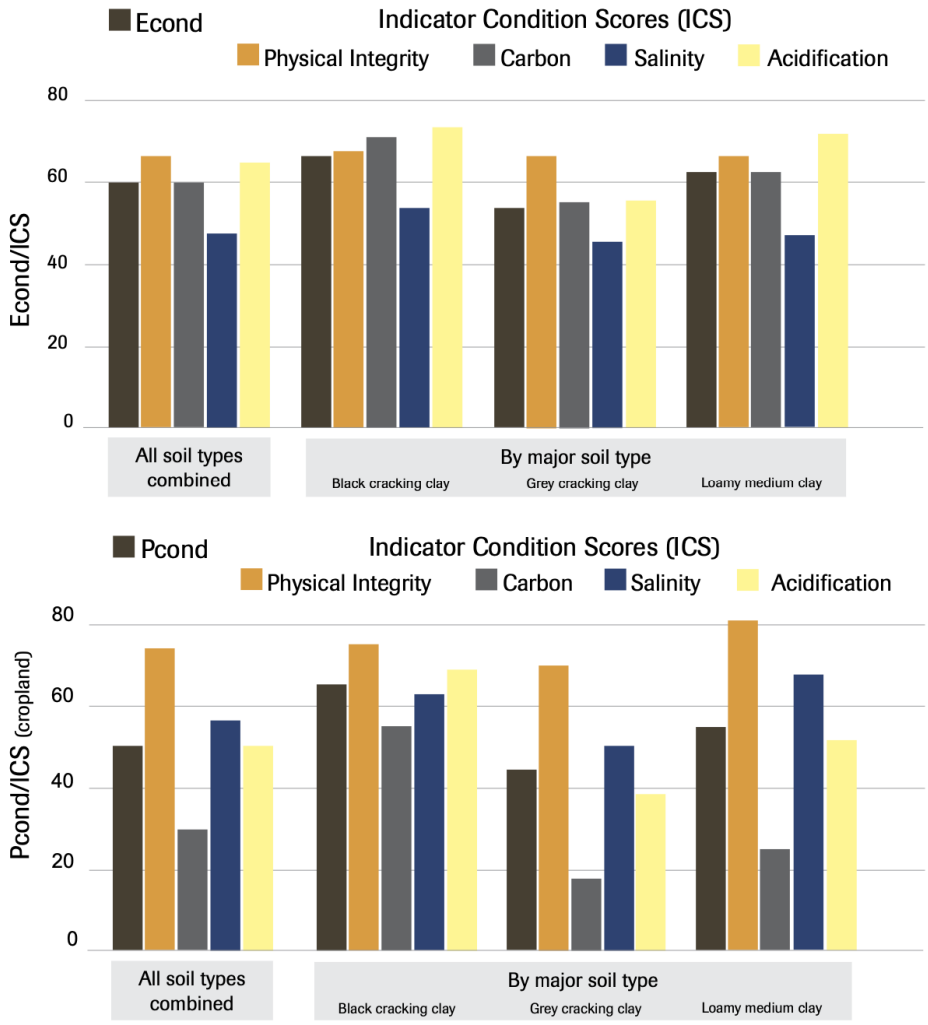

Figure 3. Soil Econd™ and Pcond contributing indicators, and their breakdown for major soil types. Above is soil Econd™ and underlying indicator condition scores for both the aggregated and individual soil types across the FFL landscape. Below, is the Pcond, calculated just across the cropping soils and relative to an idealised production soil (Source: Figure 7 from the Kilter Rural FFL Winlaton Environmental Account Summary 2018).

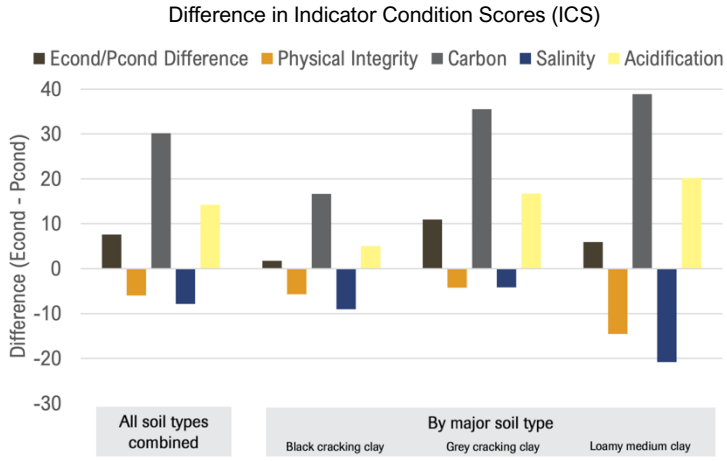

Figure 4. The difference between the Econd and Pcond and the Indicator Condition Scores shown in Figure 3. If the bar is above the line, it means the ICS for the Econd was larger, if the bar is below the line it means the ICS for the Pcond was larger.