



2018 FUTURE FARMING LANDSCAPES WINLATON

Environmental Condition Account – Summary

This statement provides a summary of the Proof of Concept-accredited 2018 FFL Environmental Account for FFL Winlaton. Information presented here is extracted from the Account itself and its accompanying Information Statement.

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The Account was provisionally accredited in June 2019 following peer review by Wentworth Group of Concerned Scientists. Formal accreditation will occur upon ratification by the Accounting for Nature Accreditation Authority, currently being established.

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ENVIRONMENTAL ACCOUNTING

Kilter Rural has adopted the Wentworth Group of Concerned Scientists' *Accounting for Nature* methodology to consistently monitor, record and interpret ecological changes in the health and condition of the natural assets of soil and native vegetation, on farmland in north-west Victoria.

The project is the first farm-level environmental account produced under this environmental accounting framework, and is conducted on farmland developed and managed for profit-to-member superannuation fund VicSuper's Future Farming Landscape investment at Winlaton.

The framework aims at driving environmental stewardship on landscapes to secure the long-term health of Australia's land, water and biodiversity. It provides landscape managers with an approach that utilises farm-level monitoring to generate environmental asset condition assessment with rigour and accountability.

Within the standardised and quantified reporting framework, Kilter Rural has been able to score the condition for key assets at various sites across the Winlaton property. Monitoring data collected between 2007 and 2018 has been converted into the framework's established reporting scores, known as Econds, on a scale of 0 to 100 to show relative change over time.

Kilter Rural will continue to use the methodology to establish environmental accounts at all its farmland investments in the southern Murray-Darling Basin, as it provides a consistent and comparable reporting framework.



OVERVIEW

Through adoption of the *Accounting for Nature* framework, Kilter Rural has quantified improvement in the natural assets on 8900ha of farmland managed through VicSuper's Future Farming Landscapes investment at Winlaton in north-west Victoria.

The 2018 Future Farming Landscape Winlaton Account reports that between 2007 and 2018:

1. Vegetation condition has nearly doubled from an Econd score of 11 to 20, or 90% improvement towards the 2022 target goal of 22, and
2. Soil condition has advanced from an Econd score of 50 to 60, a 50% improvement towards the 2022 ambition of 70.

The Wentworth Group of Concerned Scientist's interim accrediting panel has afforded the Future Farming Landscapes Winlaton environmental account Proof of Concept Accreditation.

This booklet showcases the methodology and outcomes of this environmental accounting effort. Throughout, the Wentworth Group of Concerned Scientist's is referred to as WGCS, *Accounting for Nature* as AfN, and Future Farming Landscapes at Winlaton as FFL Winlaton.



FFL WINLATON

Kilter Rural invests in Australian water, farmland and ecosystem assets; and believes environmental accounting in agribusiness can shape the future for sustainable food and agriculture. The compelling combination of technology, science and validated environmental assessment enables progressive operators to track the health and condition of natural assets, such as soil, water and native vegetation.

Kilter Rural understands that having an established and accredited framework to monitor and compare the health and condition of natural assets is invaluable in informing management decisions to deliver long-term sustainable food and fibre to customers and long-term value to investors.

The FFL Winlaton investment of VicSuper was established in 2007, and comprises 8900ha of agricultural land (irrigated summer cropping and winter cereals), low impact grazing on native forage, protected biodiversity and forestry. Irrigated agriculture occupies about 50% of the land area. The FFL landscape is managed to optimise financial returns but with a dividend of measurable social and environmental returns.

FFL Winlaton, as shown in Figure 1, comprises 35 properties that were mostly purchased separately from 2007 to 2012. Redevelopment involved each being farm being planned and reconfigured with enterprises established in 'paddocks' or Land Management Units (LMUs). The account generates a hierarchy of Econds from LMU to property and for landscape (FFL Winlaton) as a whole.

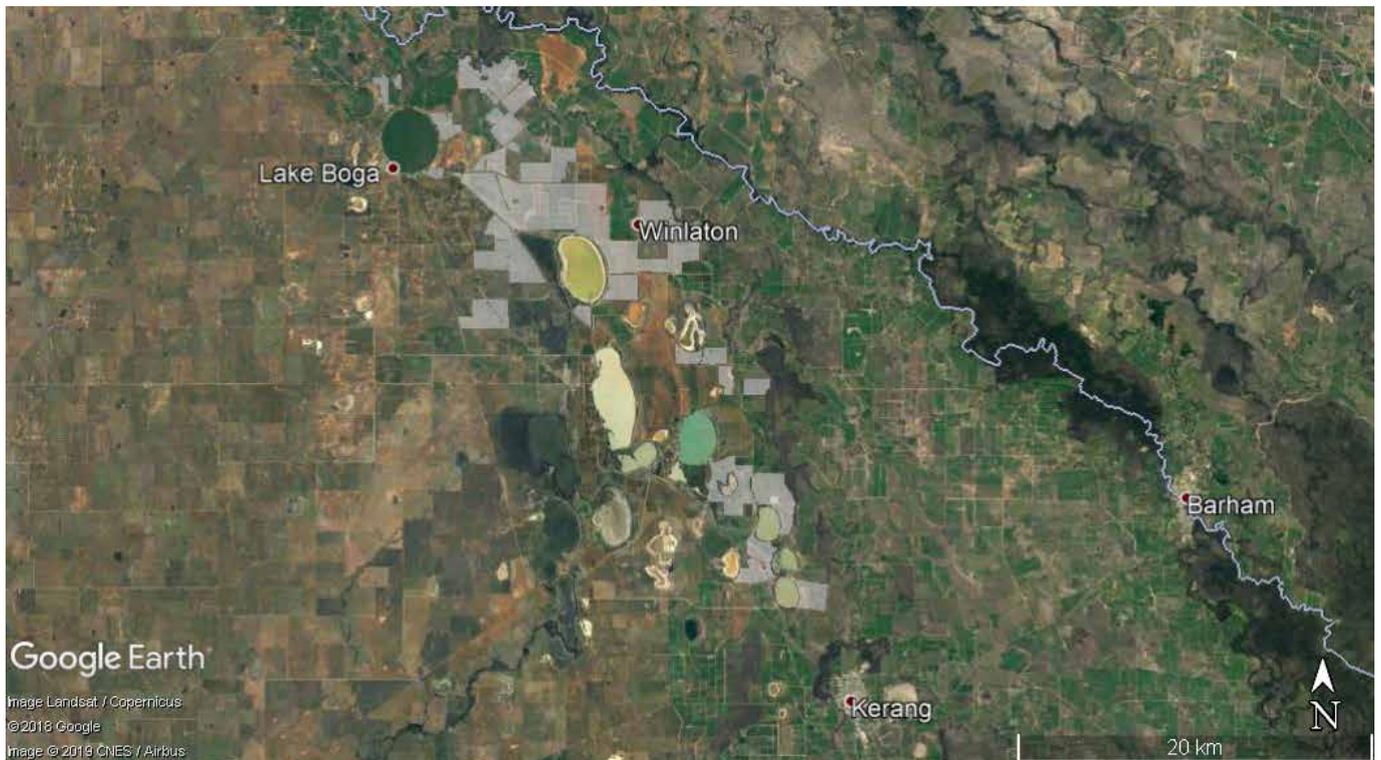


Figure 1: The Future Farming Landscapes investment at Winlaton in north-west Victoria.

ENVIRONMENTAL ASSETS

FFL Winlaton is located on the western margin of the northern Victorian Riverine Plain on the lower reaches of the Loddon and Avoca river catchments. The area is known for its terminal lakes, many naturally saline and others integrated into the Torrumbarry irrigation storage and distribution network. Flood flows across the heavy cracking clays of the floodplain are heavily constrained by levees and other built infrastructure associated with irrigation development early last century.

Near Lake Boga, the landscape is draped by dunes and loamy soils that extend westwards into the Mallee, with other localised lake lunettes and lighter, subtle rises. Historically, natural vegetation is black box woodlands on the floodplains to buloke-callitris woodlands on the dry rises, with drought and salt-tolerant shrubs (chenopods) and grasslands in the understorey. Lignum swamps are in depressions and along drainage lines.

More than 95% of FFL farmland had been directly impacted by irrigation in the past century, with vegetation and soils being highly modified. High saline watertables quickly developed across the region following the onset of irrigation that precipitated widespread degradation of soils that peaked during the 1990s. However, the millennium drought and farming structural adjustment has allowed some recovery of the hydrological imbalance.

The inaugural 2018 account considers the fundamental natural assets of native vegetation and soil, which are relatively easily characterised on farmland. Characterisation is consistent with the AfN protocol, with native vegetation benchmarked against the extent and quality of the pre-1750 state mapped ecological vegetation communities (EVCs). These EVCs are treated as asset sub-groups in the account. Table 1 shows 90% of pre-1750 vegetation is comprised Riverine Chenopod Woodland, Chenopod Grassland and Semi-arid Chenopod Woodland EVCs. Soils are divided into Lower Floodplain, Higher Floodplain and Lighter Rise sub-groups.

Natural asset	Asset category	Pre-1750 area (ha)	% of landscape
Native Vegetation	EVC: Riverine Chenopod Woodland (RCW)	5390	60%
	EVC: Chenopod Grassland (CG)	1810	20%
	EVC: Semi-arid Chenopod Woodland (SaCW)	915	10%
	EVC: Lignum Swampy Woodland (LSW)	370	4%
	EVC: All others	475	5%
Soil	Black Cracking Clays (Lower floodplain soils)	2440	27%
	Grey Cracking Clays (Higher floodplain soils)	4525	51%
	Loamy Medium Clays (Lighter rise soils)	1910	22%

Table 1: FFL account classification of native vegetation and soil assets.

As water-related assets are more challenging for characterising, these were not considered in the inaugural account. However, this is an active area of development for the next accounts. Another asset being considered for future inclusion is fauna, with birds a useful marker for ecological condition.

The 2018 FFL Winlaton account was designed as a trial for the application of AfN at farm scale. It provides a test case for what might be possible for any farmer that is keen to measure and track the ecological result of their land stewardship. For it to be mainstreamed, a farm account can only expect inclusion of routine or easily collectable information relative to a farmer's capability. However, whatever the nature of the inputs into an account this can be described (transparency) and assigned a level of assurance (robustness) to give it credibility. For a farmer, the primary driver will be to report improvement in natural asset condition and track this against an aspirational target that fits within their farming-specific context.

The Accounting for Nature framework

Kilter Rural adopted WGCS's AfN framework for its environmental accounting. First proposed in 2008, the framework supports the goal to find, implement and drive solutions for environmental stewardship to secure the long-term health of Australia's land, water and biodiversity.

AfN is an asset-based framework, it identifies, attributes and then scores the condition (Econds) of the fundamental natural resource base that in the case of a farming enterprise underpins long-term, sustainable agricultural productivity.

The framework is particularly useful for a farming enterprise because it's structure also allows condition scores relative to other reference benchmarks, such as the ideal production soil (Pconds). Though intrinsically asset based, it's structure can potentially enable scoring of threatening processes (Iconds) and so further enabling its ability as a farm management tool.

Kilter Rural commits that environmental accounts under AfN will be produced and accredited annually for its managed land assets. However, it also understands that discernible trends (above natural variation) in natural asset condition may require three to five years of account building. For a farming enterprise it is condition trend, and aspiring to a target in condition, that will be the driver for use.





2018 ACCOUNT BASICS

The 2018 FFL Winlaton environmental account (EA) is developed from an assemblage of the best information available. The data has varying levels of currency, in part owing to the sheer volume of information that the account is able to capture and also that timing of survey and collection has not been specifically driven by the needs of this first account (the established accounting system now provides a clear driver for systematic data collection).

Geographical complexity owing to the 35 separate and varying contiguous properties under management means the spatial basis of the account is similarly complex. Depending on the asset type environmental condition, scores are resolved as finer scale at the paddock ('land management unit' or LMU) level, and then these aggregated to the property and then overall farm level.

A wide range of data is used to populate the account. For many condition indicators (for instance the 'composition' of native vegetation), multiple and differently resolved data types and interpretative methods or assumptions are applied in order to be able to attribute the basic spatial elements of the account. Importantly, every condition score for every entity is ascribed a level of data quality, as shown in Table 2, and this is aggregated to the level of reporting (LMU, property or overall farm).

Rating		Description
5	Comprehensive	Use of a complete and statistically rigorous dataset (i) representative of the Indicator and (ii) over a representative portion of the area being assessed.
4	Substantial	Use of a technically recognised measurement of the Indicator with a data coverage over a significant proportion of the area.
3	Good	Access to adequate proxy data for an indicator (e.g. site photographs) or through workshopped expert judgement. Or a higher level of data (4 or 5 above) over a minor part of the area.
2	Reasonable	Expert judgement assisted by citable local observation and complemented by remote data.
1	Limited	Expert judgement from a remote reference point (e.g. aerial imagery).
0	No Assurance	Judgement with no data or expertise.

Table 2: Quality assessment rating of condition indicators.

For benchmarking purposes, the 2018 account also presents an assessment of asset condition as at 2007, the time of first property purchase. This allows the account to reflect change from the time that new stewardship regime began implementation. Information for ascribing asset condition in 2007 is vastly coarser and different to that available in 2018, with 2007 attribution in some cases relying simply on assumption (particularly soils) and in others interpretation of historical imagery (e.g. Google Earth imagery for native vegetation extent).

NATIVE VEGETATION CONDITION

The 2018 FFL Winlaton Environmental account incorporates both an account for 2018, and a baseline 2007 account for native vegetation.

The selection of the condition indicators is reflective of Victoria's Habitat Hectare approach that considers the attributes of vegetation – extent, composition (structure, diversity and recruitment) and configuration (connectivity and size).

As there are many discrete vegetation patches scattered across the 35 properties an amalgam of approaches was adopted to assess their condition. These approaches are of varying technical rigour, this being recognised in the account with the use of the following indicator quality assessment ratings:

1. In-paddock transect surveys.
2. Interpretation of current or recent visual record (photographs) against benchmark visual condition ((the visual history in Figure 2 shows an example of change between 2007 and 2018).
3. Interpretation of current or recent aerial imagery (Google Earth).
4. Expert judgment of Kilter Rural environmental managers.



Figure 2: The Account uses photopoints (top) and publicly available Google Earth aerial imagery (above) to assist assessment of native vegetation condition. The images on the left relate to a dry, cropped paddock before land acquisition (used as input for 2007 condition scores). Images on the right represent the condition of the same paddock with regenerating woodland and lignum swampland relevant to 2018 condition assessment.

The Native Vegetation (NV) Econd for the 2018 account is 20.4 (figures 3 and 4). This is largely reflective of about 50% of the farm occupied with some form of native vegetation cover, much of this is currently in just fair, albeit slowly, recovering condition. A substantial cover of the native vegetation is in the form of shrubby regrowth on former irrigated floodplain. Overall, the quality of data underpinning the NV Econd calculation is attributed a score of 3 or 'good'.

An Econd baseline score for native vegetation in 2007 of 11.2 was calculated by assessing publicly available Google Earth aerial imagery available for this time supported by early FFL Winlaton photopoint records. From the aerial imagery the extent of non-cultivation (assumed native vegetation regrowth) was interpreted. An assessment of vegetation quality was made from the imagery supported by the available photographic record. A data quality score of 2 recognises the coarser level of analysis.

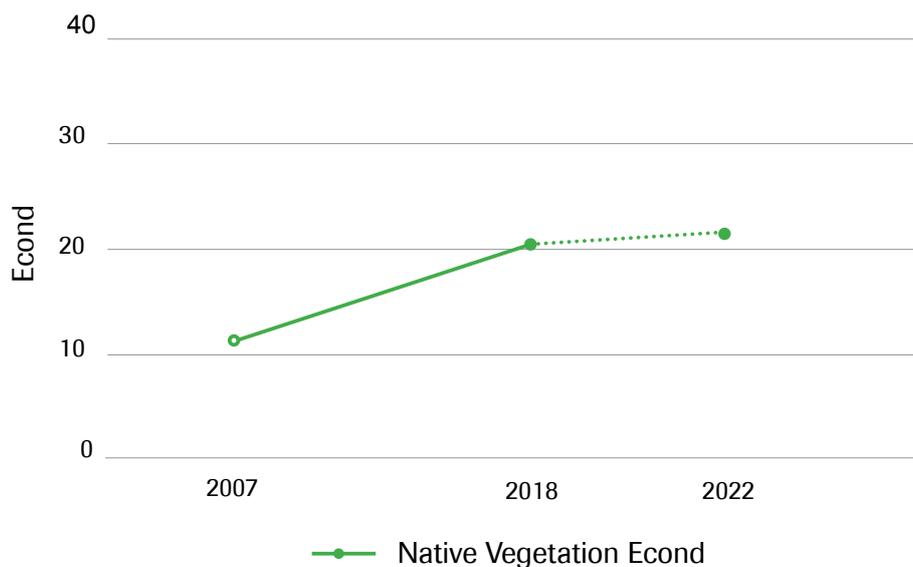


Figure 3: Native vegetation Econd trajectory 2007-2018 and projected to 2022.

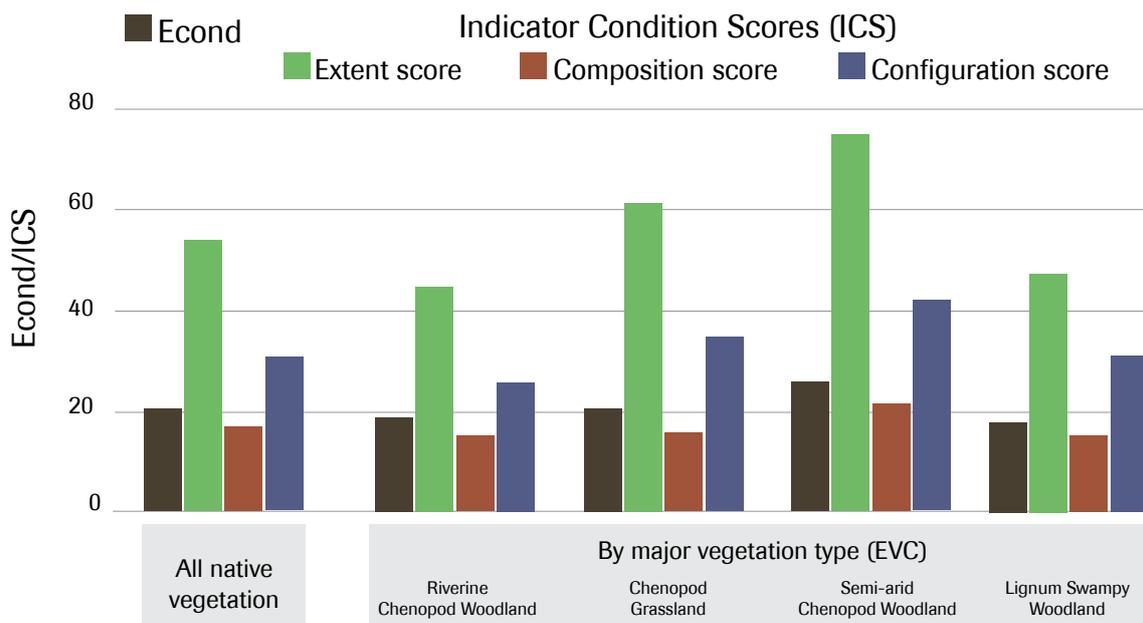


Figure 4: NV Econds, contributing condition indicators, and their breakdown for major vegetation types.

SOIL CONDITION

The 2018 FFL Winlaton Environmental Account incorporates an account for soil that is equally relevant to the status of both agricultural and environmental lands. This account innovates a score, not just referenced, against assumed pristine condition (the Econd), but also a score relative to an idealised production soil particular to our agricultural lands (the Pcond).

The condition indicators used in the account include physical integrity, soil carbon, salinity and acidification that were all identified in the regional trials for the application of AfN (Table 3). Other identified indicators were considered but not included in the account because they were of low materiality (erosion) or that there was a scarcity of data (nutrients and soil biology).



Figure 5: The images on the left show 'new' relatively unimproved agricultural soils immediately post-farm redevelopment. Images on the right show improved soil structure following several years of active biomass inputs and prudent irrigation management. More difficult soils of the agricultural precinct are also conditioned with a multi-year lucerne rotation that fixes nutrient and creates pathways for air and water movement through the root zone.

Condition indicator	Measurement applied
Physical integrity	Weighted Emerson Scores (measure of dispersion and slaking) over A1, A2, B1, B2 soil layers. Unit step down of weighting with layer depth.
Carbon	Total Carbon as % of soil mass in the A1 layer of the topsoil.
Salinity	Average soil salinity from saturated soil extract (ECe) over the root zone layers - A1, A2, B1.
Acidification	Average soil pH (in water) over the topsoil layers - A1, A2.

Table 3: Soil condition indicators and their measurement.

Cropping soils are systematically sampled and analysed as part of an existing monitoring program, so can relatively easily meet the data demands of the adopted condition indicators. This systematic monitoring is designed to satisfy short-term agronomic management decisions but also more intrinsic soil function crucial for ensuring long-term sustainable production and resilience. Soil sampling incorporates the use of observational pits (image bottom right in Figure 5), these same sites revisited on a rolling three-year cycle. More assumptive and extrapolated soil attribute information occurs across environmental lands owing to much lower data density.

For both the Econd and PCond calculations (Figure 7), the component condition indicator scores are averaged to produce final scores.

The soil Econd for the 2018 account is 60. Of the three soils types, the Black Cracking Clays (BCCs) of the lower flood plain scored best, being at the upper end of the 55 to 66 range. Of the four condition indicators salinity was weakest, scoring 48 across all soil types. It is reasonable that salinity is the main limiting condition factor given the extensive landscape history of soil salinisation. Data quality assurance scored 3 ('good') across all three of the indicators with the other, physical integrity, scoring 2.5 because of its more interpretative measurement.

The soil Pcond for the 2018 account scored was somewhat lower at 52. Again, BCCs scored best (65). Interestingly, soil carbon was easily the poorest scoring indicator (30), indicative that FFL Winlaton production soils have significant improvement before they approach levels of an idealised agricultural soil. Note, soils data used in the 2018 account was collected between 2015 and 2016.

Baseline 2007 condition was not formally calculated owing to insufficient replicable soil data available at this time. However, there is a reasonable presumption that soil condition has generally improved in the decade since, so that baseline placemark values (50 for the Econd, 35 for the Pcond) were applied.

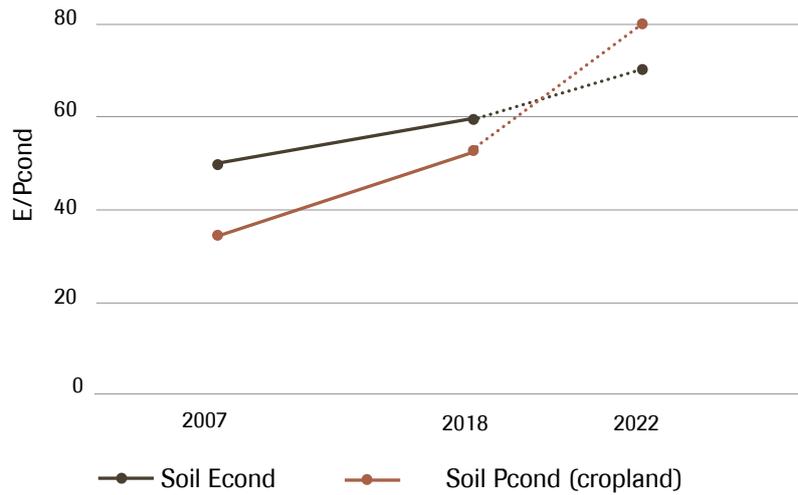


Figure 6: Soil Econd, Pcond and trajectories 2007-2018, and projected to 2022.

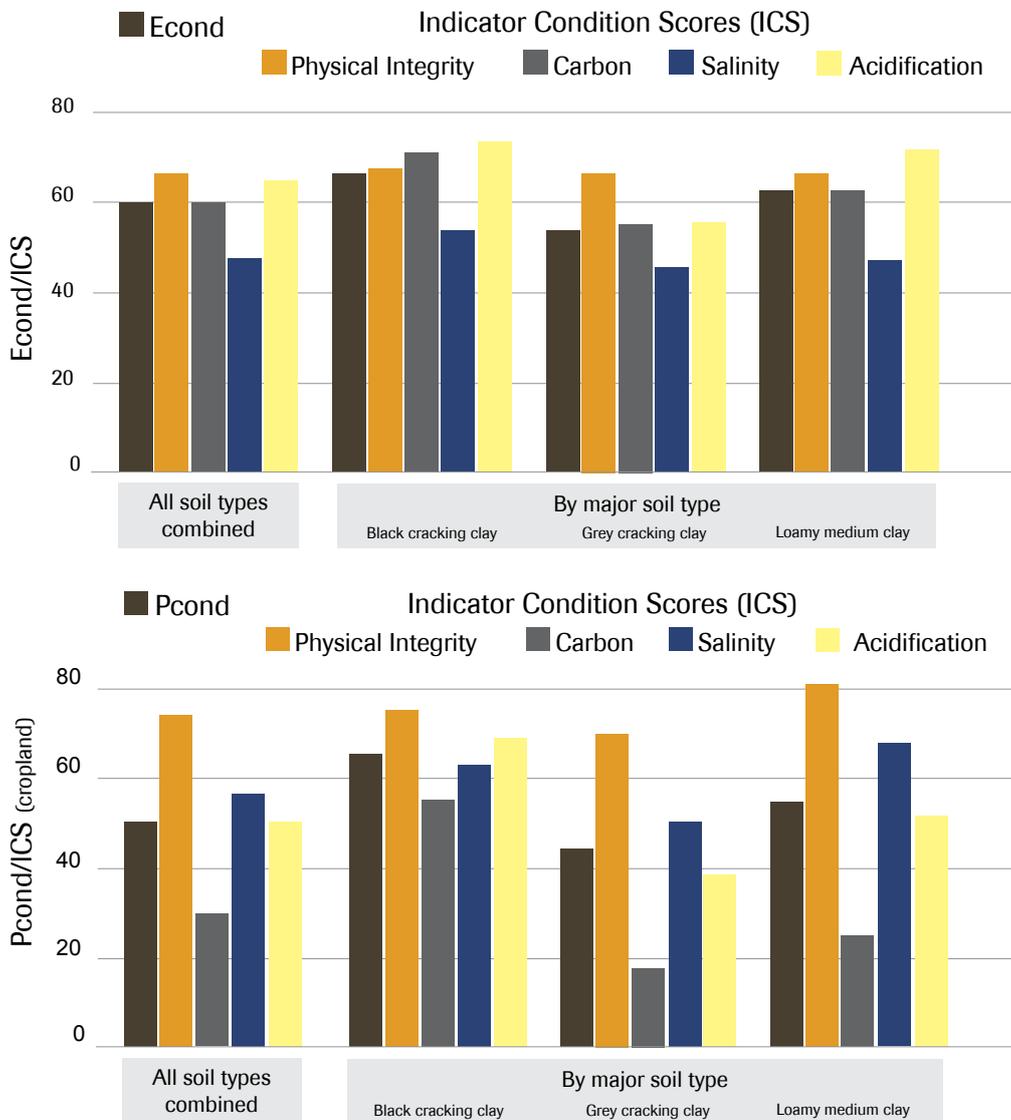


Figure 7: Soil Econds and Pconds contributing indicators, and their breakdown for major soil types. Above is soil Econd and underlying indicator condition scores for both the aggregated and individual soil types across the FFL landscape. Below, is the Pcond, calculated just across the cropping soils and relative to an idealised production soil.

2018 ACCOUNTS BY THE NUMBERS

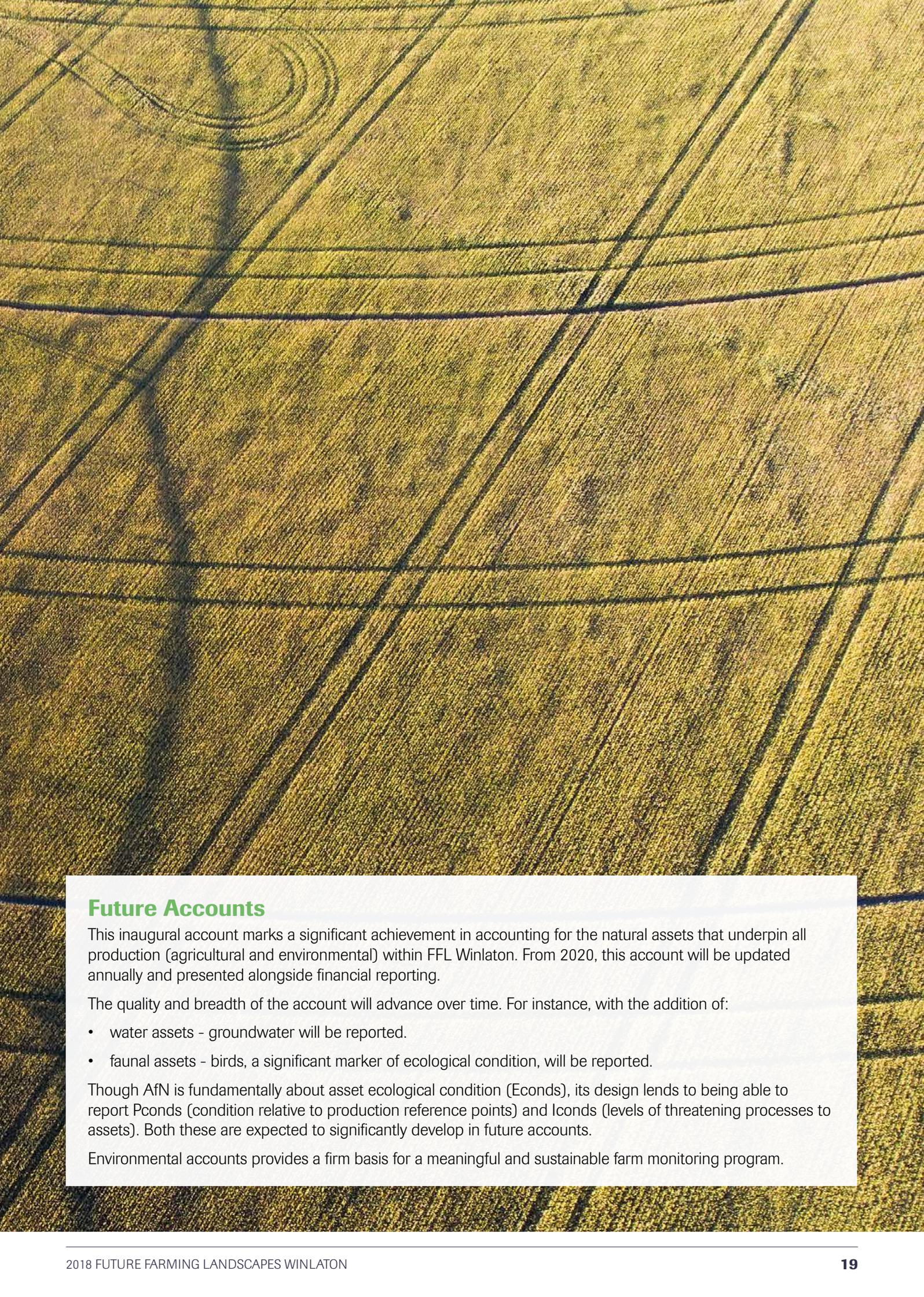
Native vegetation

Condition scores of FFL Winlaton native vegetation assets								
	2007				2018			
	Extent Score	Composition Score	Configuration Score	Econd	Extent Score	Composition Score	Configuration Score	Econd
All EVCs	36.4	8.7	18.9	11.2	53.4	17.0	30.8	20.4
Riverine Chenopod Woodland EVC	40.4	10.0	21.2	12.8	45.0	16.0	25.9	18.5
Chenopod Grassland EVC	29.2	6.5	14.8	8.5	61.0	15.9	36.1	21.0
Semi-arid Chenopod Woodland EVC	21.4	4.8	11.9	6.4	75.0	21.3	41.0	26.2
Lignum Swampy Woodland EVC	37.9	9.2	25.4	13.3	47.0	14.6	30.7	18.6

Soil

Condition scores of FFL Winlaton soil assets											
	2007 Econd	2018 Econd					2018 Pcond				
		Physical Integrity	Carbon	Salinity	Acidity	Econd	Physical Integrity	Carbon	Salinity	Acidity	Pcond
All Soil	50	67	60	48	64	60	73	30	56	50	52
Black Cracking Clays		68	71	53	74	66	74	54	62	69	65
Grey Cracking Clays		66	54	45	55	55	70	18	50	39	44
Loamy Medium Clays		66	62	47	71	62	81	23	68	51	56





Future Accounts

This inaugural account marks a significant achievement in accounting for the natural assets that underpin all production (agricultural and environmental) within FFL Winlaton. From 2020, this account will be updated annually and presented alongside financial reporting.

The quality and breadth of the account will advance over time. For instance, with the addition of:

- water assets - groundwater will be reported.
- faunal assets - birds, a significant marker of ecological condition, will be reported.

Though AfN is fundamentally about asset ecological condition (Econds), its design lends to being able to report Pconds (condition relative to production reference points) and Iconds (levels of threatening processes to assets). Both these are expected to significantly develop in future accounts.

Environmental accounts provides a firm basis for a meaningful and sustainable farm monitoring program.



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