

# Iford Estate Greenhouse Gas (GHG) Report

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## Work undertaken

The Iford Estate requested Chavereys undertake an assessment of the net greenhouse gas (GHG) emissions and removals occurring from land management activities at Iford Estate for 2021. In addition, it was requested that Chavereys model the changes to net emissions that will result from their planned Landscape Recovery Scheme.

The methodology used for accounting and reporting follows the GHG Protocol Corporate Standard<sup>1</sup> and covers the Scope 1, Scope 2 and Scope 3 emissions relating to Iford Estate's in-hand operations.

The inventory includes emissions from the combustion of fossil fuels, biological nitrous oxide (N<sub>2</sub>O) and methane (CH<sub>4</sub>) emissions inherent to fertiliser applications to soils, enteric fermentation from cattle, and management of crops residues. Also included are the Scope 3 emissions from the production of purchased inputs.

Emissions and removals by soils, trees and hedgerows are included. Whilst the metrics used are coarse, they are based on approaches used in national emissions modelling and following the calculation guidelines of the UN Intergovernmental Panel on Climate Change<sup>2</sup>.

## Summary

Our analysis indicates that the Iford Estate emitted 4,084 tCO<sub>2</sub>e in 2021, with the main sources of emissions being application of fertiliser to soils, the emissions embedded in the production of fertiliser, and methane produced by cattle.

The application of regenerative arable farming practices, woodland, and the large growth hedgerows, removed approximately 1,134 tCO<sub>2</sub> (33% of emissions), giving net emissions of 2,951 tCO<sub>2</sub>e for the year.

In the planned landscape recovery scenario, 250 ha of arable is reverted to organic grassland habitat but cattle numbers will not be increase. Grassland stores more carbon than arable, and the land use change will sequester 2,035 tCO<sub>2</sub> per year. 30 ha of new woodland will sequester an additional 328 tCO<sub>2</sub> per year. combined with the reduction in emissions Iford Estate will become a carbon sink removing a net of 1,371 tCO<sub>2</sub> per year from the atmosphere. For context the Average UK household emits 16 tCO<sub>2</sub>e per year.

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<sup>1</sup> [Corporate Standard | Greenhouse Gas Protocol \(ghgprotocol.org\)](https://ghgprotocol.org/)

<sup>2</sup> [Publications - IPCC-TFI \(iges.or.jp\)](https://www.iges.or.jp/publications/)

## Land Use and Land Management

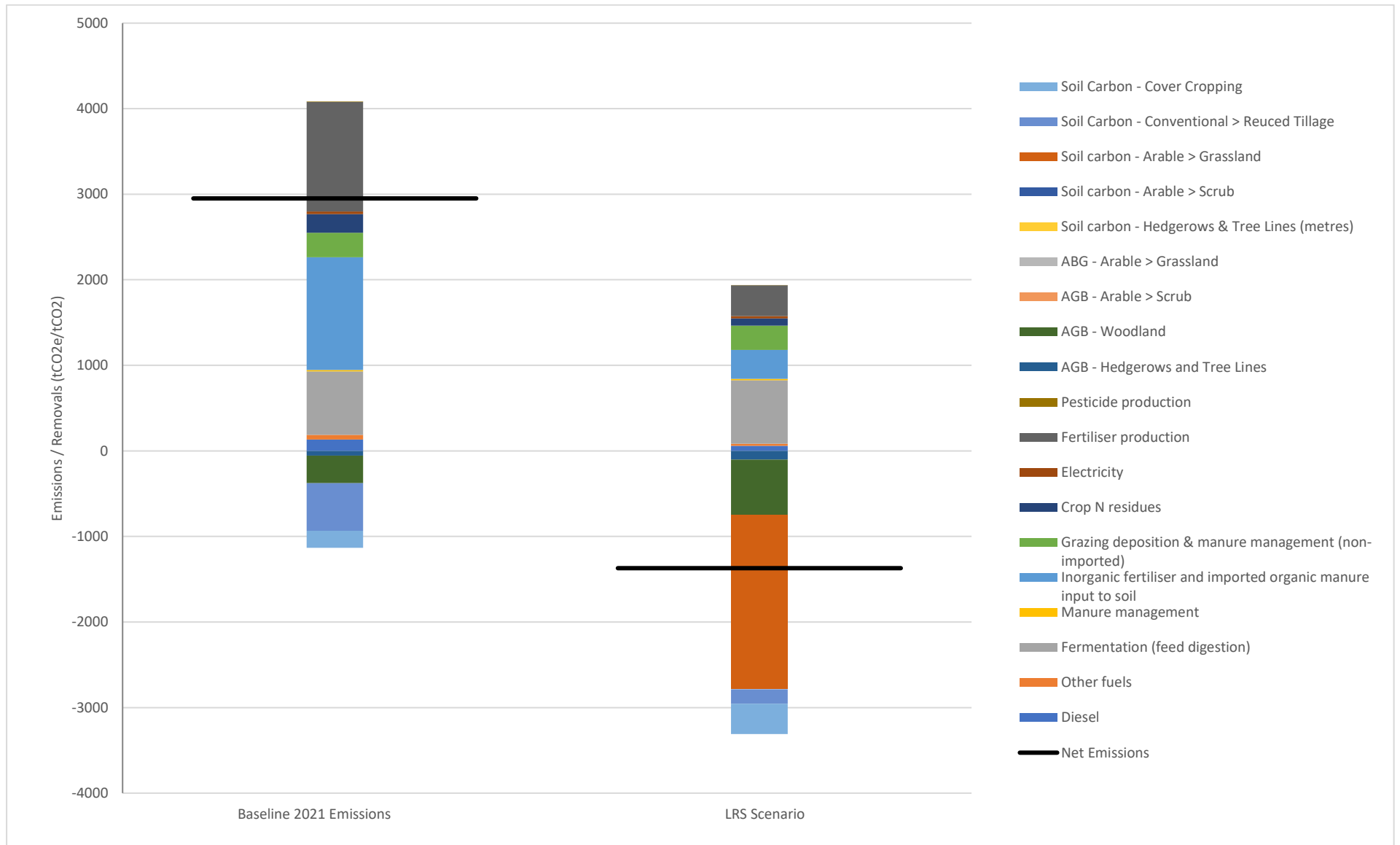
The following table sets out the land uses and land management which will impact carbon emissions and removals carbon. Following IPCC Guidelines, we model changes in management practice or land use that have occurred in the last 20 years, where these changes increase or decrease carbon stocks we calculate the emissions or removals of CO<sub>2</sub>. For example, grassland stores more carbon than arable soils, so reversion of arable to grassland will remove carbon from the atmosphere.

Land Use	Baseline (ha)	LRS (ha)	+/-
Arable	696	250	(-446)
<i>Conventional to Reduced Tillage</i>	248	0	
<i>Conventional to No Tillage</i>	82	250	
<i>No Cover Crops to Cover Crops</i>	137	250	
Managed Grassland (Hay and graze)	58	0	(-58)
Biodiversity Grassland (Organic)	563	1,067	(+474)
Woodland & Hedgerows	27	57	(+30)
<b>Combined Area</b>	<b>1,412</b>	<b>1,412</b>	

## Emissions Inventory for 2021 and LRS

	Units	2021	LRS
<b>Emissions</b>			
<b>Scope 1: Direct emissions</b>			
<b>Energy Use</b>			
Diesel	tCO <sub>2</sub> e	133	59
Other fuels	tCO <sub>2</sub> e	55	25
<b>Non-mechanical: Methane</b>			
Fermentation (feed digestion)	tCO <sub>2</sub> e	742	742
Manure management	tCO <sub>2</sub> e	15	15
<b>Non-mechanical: Nitrous Oxide</b>			
Fertiliser and imported organic manure input to soil	tCO <sub>2</sub> e	1319	338
Grazing deposition & manure management (non-imported)	tCO <sub>2</sub> e	285	285
Crop N residues	tCO <sub>2</sub> e	219	83
<b>Total Scope 1 Emissions</b>		<b>2768</b>	<b>1547</b>
<b>Scope 2: Emissions from purchased electricity</b>			
Electricity	tCO <sub>2</sub> e	30	30
<b>Total Scope 2 Emissions</b>		<b>30</b>	<b>30</b>
<b>Scope 3: Emissions from value-chain</b>			
<b>Purchased Goods and Services</b>			
Fertiliser production	tCO <sub>2</sub> e	1281	359
Pesticide production	tCO <sub>2</sub> e	6	2
<b>Total Scope 3 Emissions</b>		<b>1287</b>	<b>361</b>
<b>Total Scope 1, 2 and 3 Emissions</b>		<b>4084</b>	<b>1938</b>
<b>Removals</b>			
<b>Crop Management</b>			
Sequestration (Reduced + No Tillage)		-556	-170
Sequestration (No > Cover Crops)		-200	-354
		-756	-524
<b>Above-Ground Biomass</b>			
Hedgerows and Tree Lines	tCO <sub>2</sub>	-56	-101
Woodland	tCO <sub>2</sub>	-321	-649
		-377	-750
<b>Soil Carbon</b>			
Arable > Grassland	tCO <sub>2</sub>	-	-2035
		<b>0</b>	<b>-2035</b>
<b>Gross Sequestration</b>		<b>-1134</b>	<b>-3309</b>
<b>Net Emissions</b>			
Total Scope 1, 2 & FLAG emissions	tCO <sub>2</sub>	4084	1938
Sequestration	tCO <sub>2</sub>	-1134	-3309
<b>Net Emissions</b>		<b>2951</b>	<b>-1371</b>

## Comparison of emissions/removals from 2021 with LRS



## Potentially Higher Estimates of Sequestration

The initial analysis has used a conservative central value for the sequestration that occurs when changing from arable to grassland.

We also carried out a comparison that assumes higher rates of sequestration for grassland which may better reflect the waterlogged nature of areas of grass. Where we used the upper estimates of sequestration from the scientific literature for the UK there is a 45% increase in sequestration to remove 4788 tCO<sub>2</sub>e per year, meaning Iford would act as a net annual carbon sink of 2851 tCO<sub>2</sub>e.

	Units	2021	LRS (Central)	LRS (High)
<b>Carbon Stock Changes</b>				
Crop Management (Tillage mgmt and cover crops)	tCO <sub>2</sub> e	-756	-524	-524
Hedgerows and woodland	tCO <sub>2</sub> e	-377	-750	-750
Soil Carbon (Arable > Grassland LUC)	tCO <sub>2</sub> e	0	-2035	-3514
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<b>Gross Sequestration</b>	tCO <sub>2</sub>	<b>-1134</b>	<b>-3309</b>	<b>-4788</b>
Total Scope 1, 2 & FLAG emissions	tCO <sub>2</sub> e	4084	1938	1938
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<b>Net Emissions</b>	tCO <sub>2</sub> e	<b>2951</b>	<b>-1371</b>	<b>-2851</b>