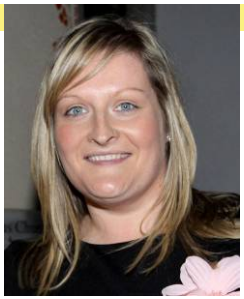

Using standard ICT & GIS to facilitate better nutrient management planning on Irish farms

Sarah Mechan[1], Stan Lalor[2], Oliver Shine[1] & David Wall[2]

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AGRICULTURAL CATCHMENTS PROGRAMME

Department of Agriculture, Food and the Marine
An Roinn Talmhaíochta, Bia agus Mara

Teagasc
Agriculture and Food Development Authority

The Irish Agriculture and Food Development Authority

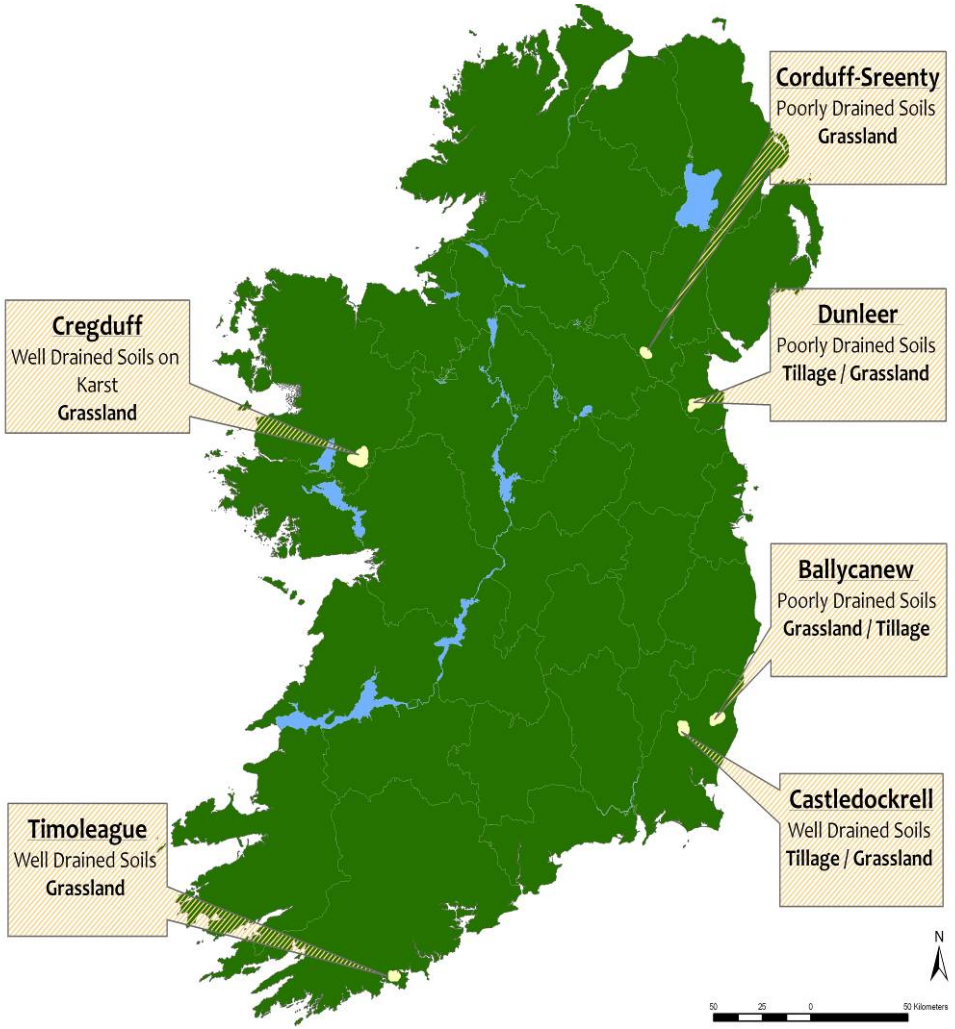
Extent

National, partnership-based research & advisory project

Promote & maintain profitable productive farming - maintaining water quality

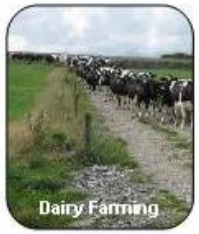
Baseline & monitoring data on agriculture and the environment in 6 agricultural catchments

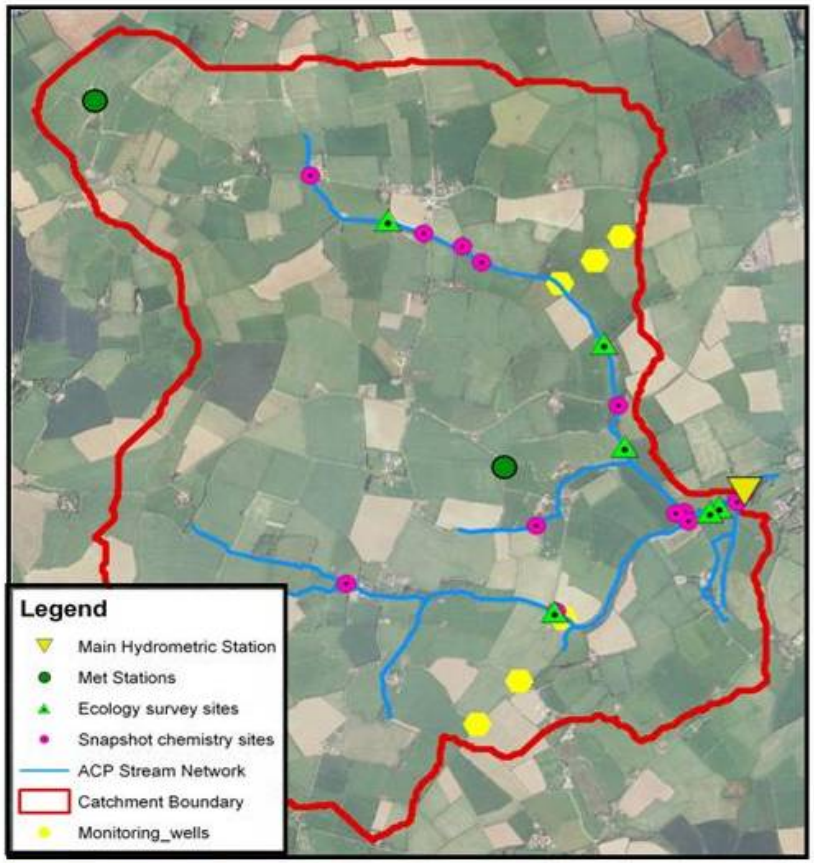
Monitoring Requirements of **Water Framework Directive** and **Nitrates Directives** including **Phosphorus**



Data components

Biophysical
- Hydrological data
- Meteorological data
- Water quality snapshot samp
- Ecological surveys
- Soil sampling campaign





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Agronomic
- Nutrient Management Records
- Nutrient Management Plans
- Farm Facilities

Financial
- National Farm Survey
- eCrops
- eProfit monitor

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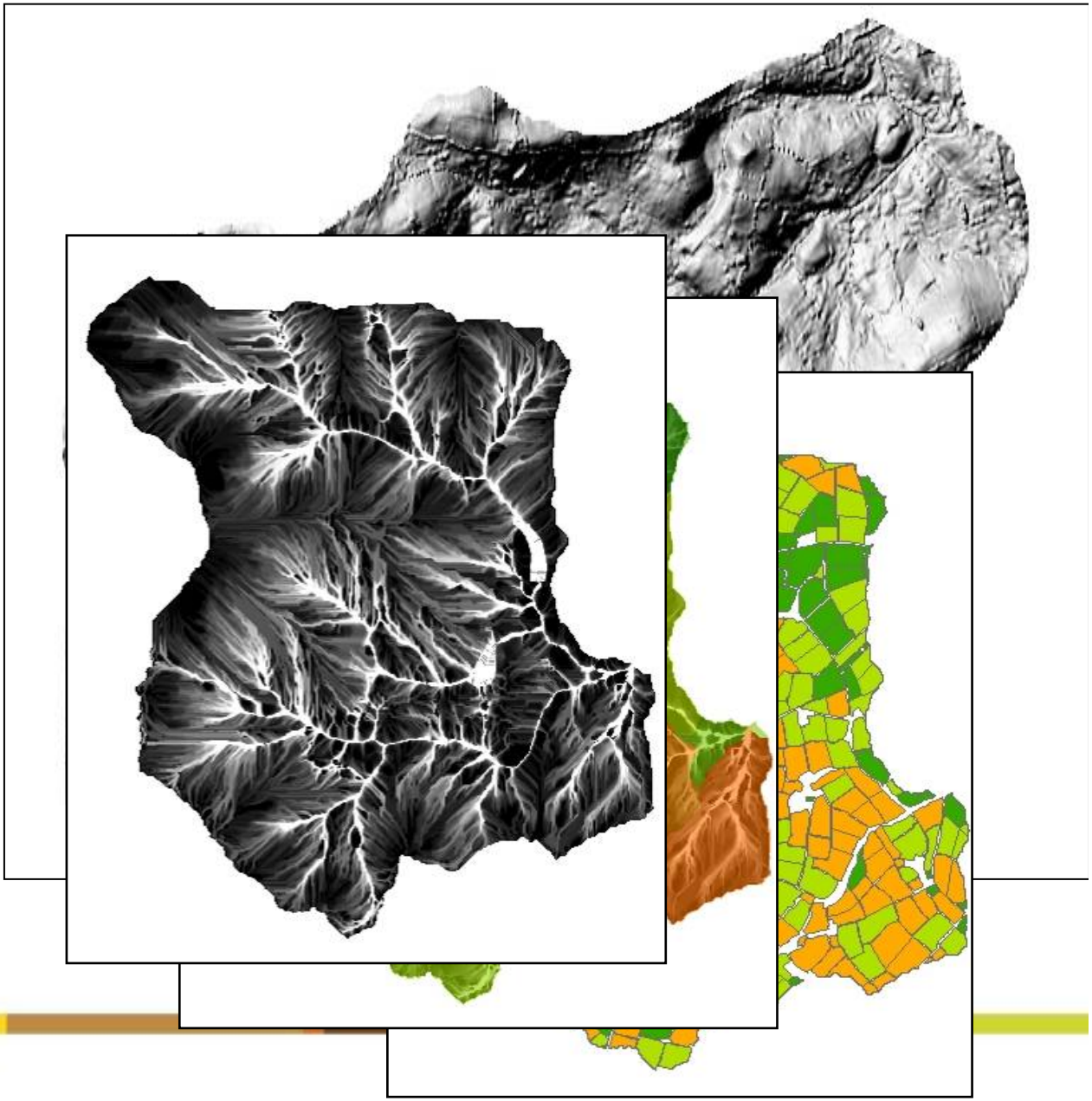
Socio-Economic
- Survey
- Focus Groups

Spatial data
- Land management units
- Connectivity Layers
- LiDAR



Instrumentation

•Auto samplers	x 24
•Bankside Analysers	x 6
•Groundwater Level Loggers	x 62
•Handheld Velocimeter	x 6
•Weather Stations	x 6
•Phosphorus Analysers	x 6
•Rain Gauges	x 7
•Sondes	x 5
•Surface Water Level Loggers	x 17
•River-bed Velocimeters	x 8
•Snapshot Water Quality Sites	x146

~300 Stations

= 3500 parameters

5, 10 & 15 minute intervals

4+ years

What is a Nutrient Management Plan (NMP)?

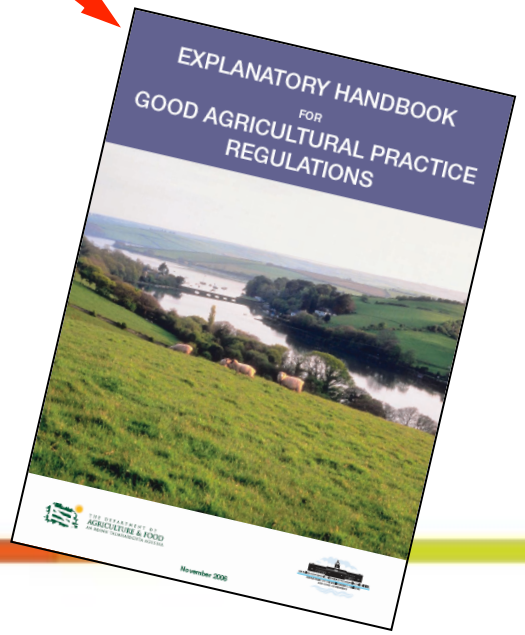
Inventory:

- Land
- Cropping
- Stocking rate
- Nutrient sources (chemical & organic)
- Soil fertility data for a farm (Soil test results)
- Farm management
- Fertilizer product & choices

➔ Nutrient recommendations for each field

- Cross-checked
- Adjusted against legislative limits to nutrient inputs for the farm

Currently controlled under SI 610 of 2010



SOIL FERTILITY

THE KEY TO GROWING YOUR PROFIT

€ PRODUCTIVE LAND

1 SOIL TESTING
- Know your soil fertility so you can plan your fertilizer.
- The cost of soil sampling is low relative to the cost of fertilizer.

2 SOIL pH & LIME
- Low pH reduces fertilizer efficiency
- Target pH for grassland = 6.3
- Target pH for tillage = 6.5

3 TARGET INDEX 3 FOR P & K
- Low fertility soils (index 1 & 2) ⇒ Apply additional fertilizer
- High fertility soils (Index 4) ⇒ A resource and can save you money

4 SLURRY & MANURES
- Where to spread? Apply to fields with a P & K requirement.
- When to spread? Apply during Spring - cool and moist weather

5 NUTRIENT BALANCE
- Choose a fertilizer compound that has the correct balance of N, P, K and S.

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5 STEPS TO BETTER SOIL FERTILITY

1 SOIL TESTING

- Provides you with vital information about your soils
- A foundation for your fertilizer plan
- A small farm expense costing in the region of €1.25/ha/yr and is valid for 5 years
- A standard soil test will give the soils fertility status as follows; pH, lime requirement, phosphorus (P) and potassium (K).

2 SOIL PH & LIME

- Lime improves the availability of Nitrogen, Phosphorus, Potassium, Sulphur, Calcium and Magnesium
- Lime at least every 5 years
- Ground limestone can be spread at any time
- Apply lime as per soil test report. Avoid over-liming as it can result in trace element imbalances.

3 TARGET INDEX 3 FOR P & K

- Index 3 is the optimum level for crop growth
- Only by soil testing will you know your P & K levels
- Index 4 soils (high fertility) are a resource - use them to save money on fertilizer
- Index 1 and 2 soils (low fertility) need additional nutrients
- Monitor your soil fertility by looking at previous analysis.

4 SLURRY & MANURES

- Plan when and where slurry/manure will be best utilised
- Aim to apply slurry in spring during moist cool conditions
- Apply slurry and manures on land that requires P & K
- Take account of nutrients contained in slurry if applying chemical fertilizer to the same area
- Always observe buffer zones from watercourses and wells.

5 NUTRIENT BALANCE

- Develop a fertilizer plan for your farm
- Get the best value from fertilisers and organic manure
- Enhance crop yield and animal performance
- Reduce environmental risks due to field losses of excess nutrients
- Potential cost savings when all nutrient inputs are accounted for.

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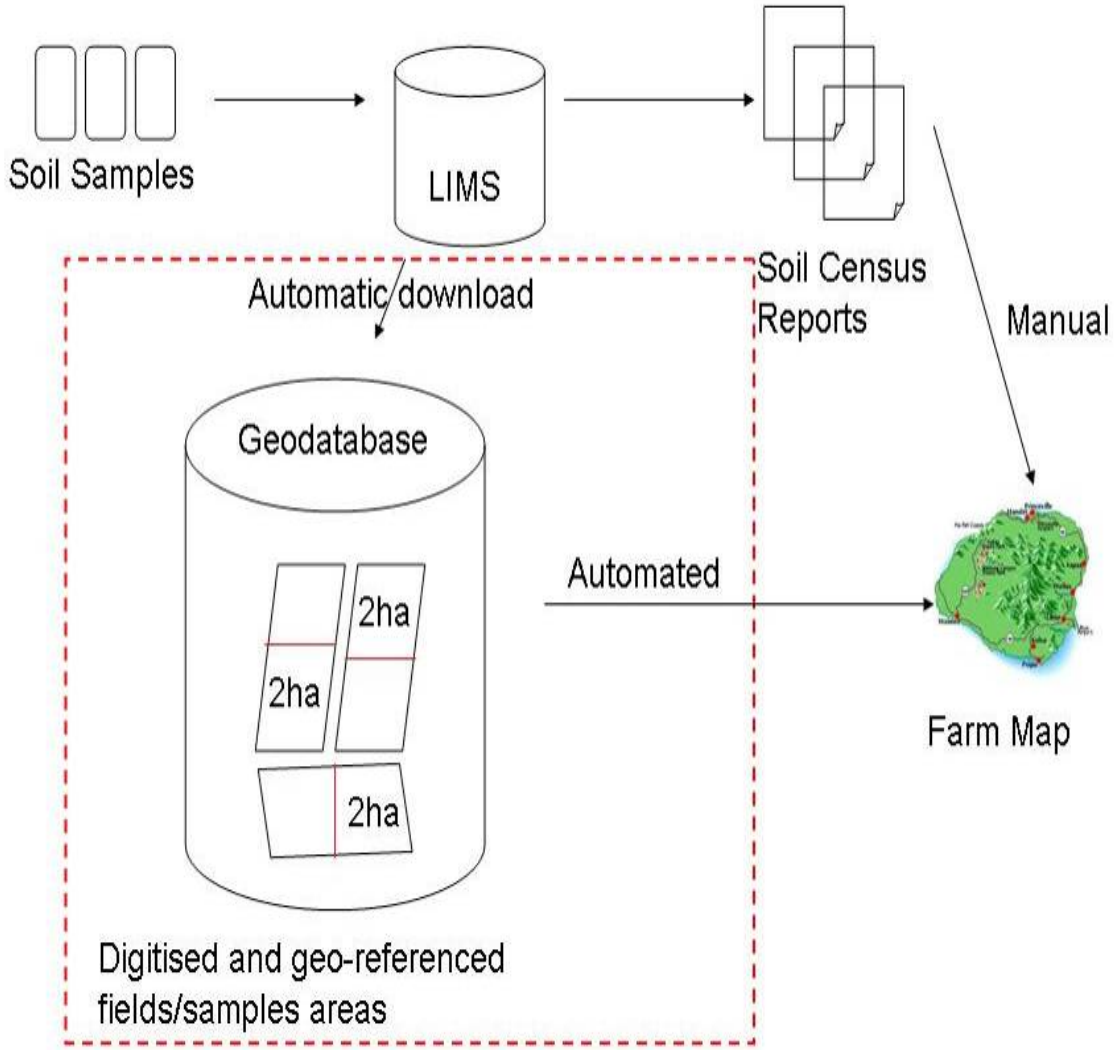
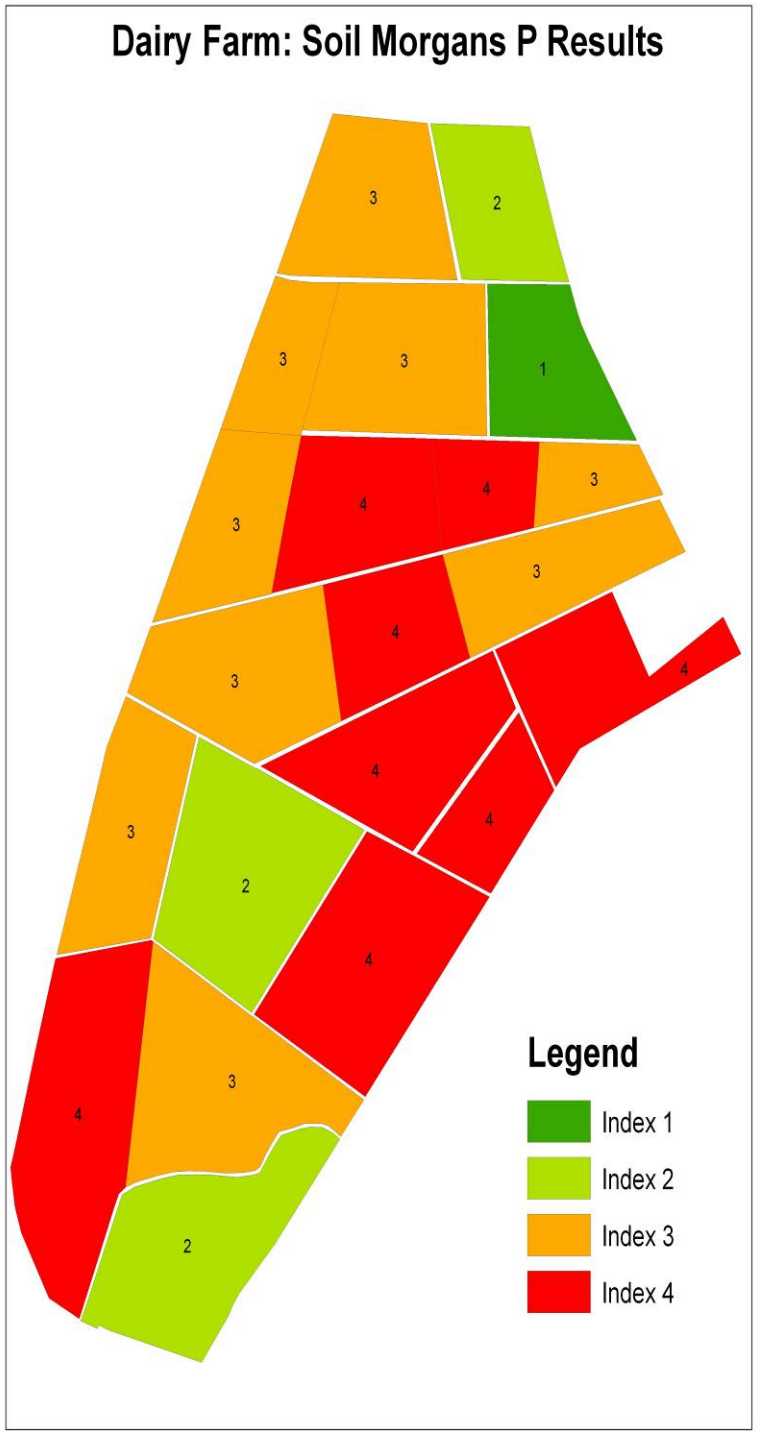
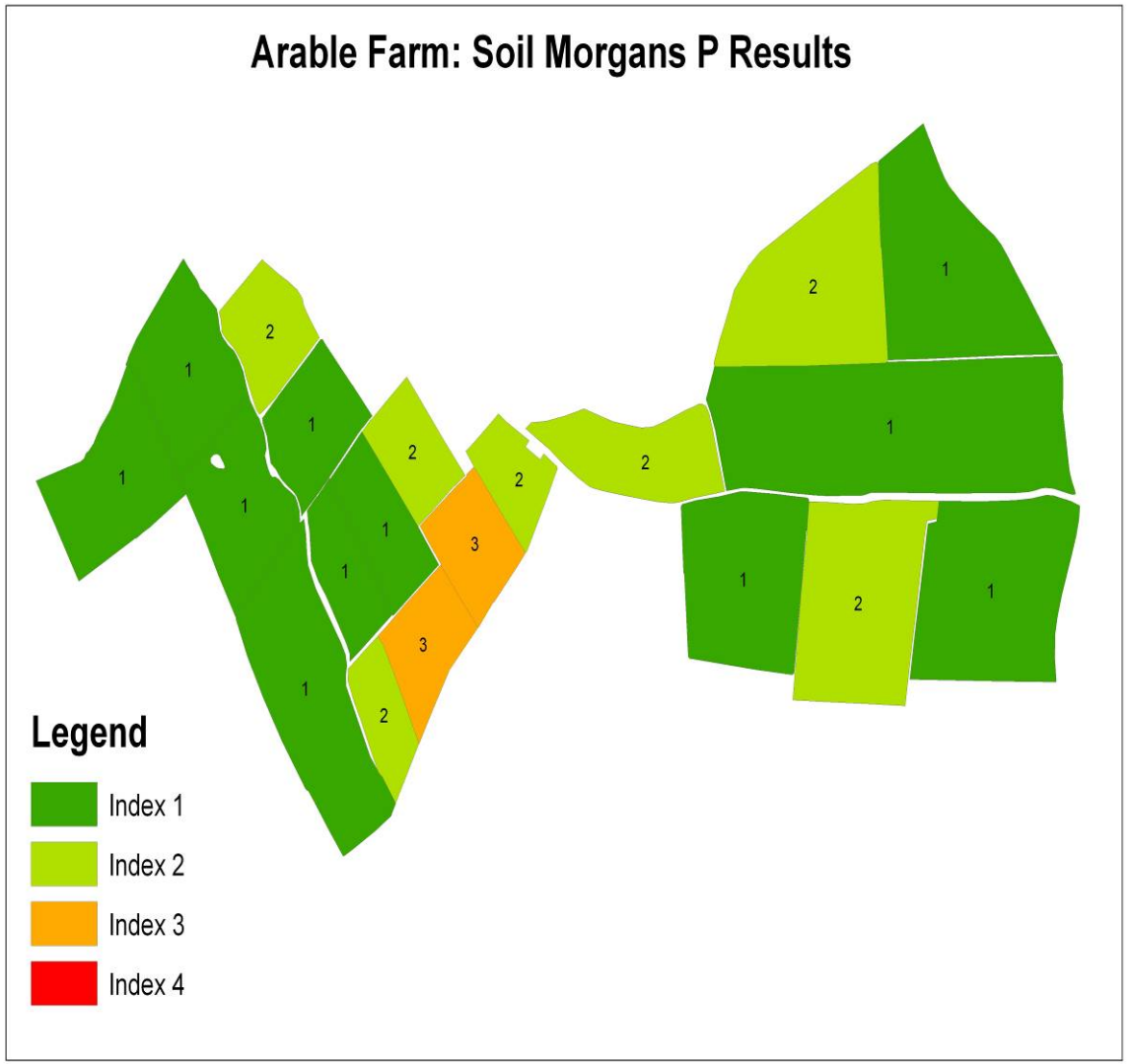
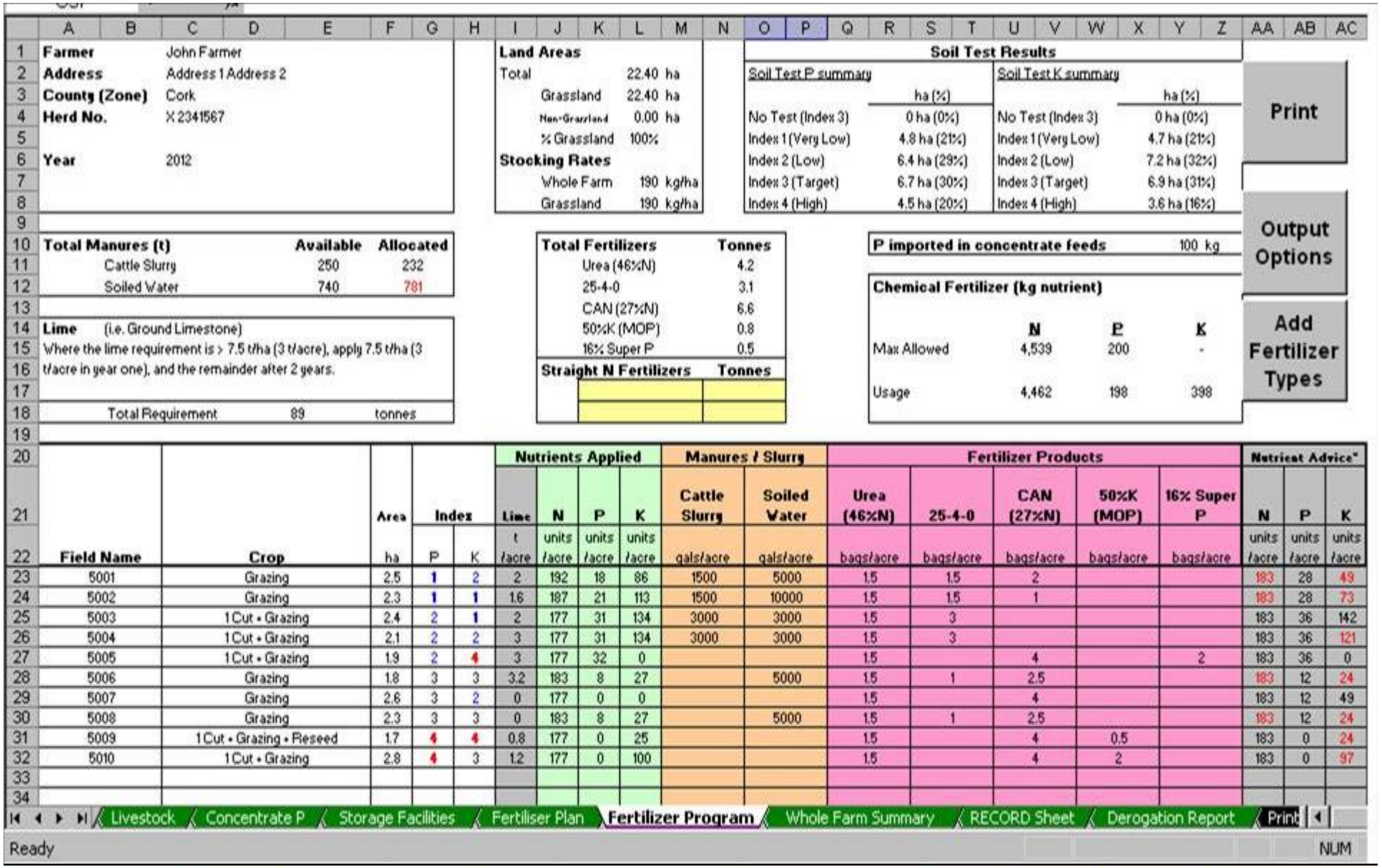
Soil Census Schema







h Agriculture and Food Development Authority



Farmer	John Farmer
Address	Address 1 Address 2
County (Zone)	Cork
Herd No.	X 2341567
Year	2012

Land Areas

Total	22.40	ha
Grassland	22.40	ha
Non-Grassland	0.00	ha
% Grassland	100%	

Stocking Rates

Whole Farm	190	kg/ha
Grassland	190	kg/ha

Soil Test Results

Soil Test P summary	ha (%)	Soil Test K summary	ha (%)
No Test (Index 3)	0 ha (0%)	No Test (Index 3)	0 ha (0%)
Index 1 (Very Low)	4.8 ha (21%)	Index 1 (Very Low)	4.7 ha (21%)
Index 2 (Low)	6.4 ha (29%)	Index 2 (Low)	7.2 ha (32%)
Index 3 (Target)	6.7 ha (30%)	Index 3 (Target)	6.9 ha (31%)
Index 4 (High)	4.5 ha (20%)	Index 4 (High)	3.6 ha (16%)

Print

Output Options

Add Fertilizer Types

Total Manures (t)	**Available**	**Allocated**
Cattle Slurry	250	232
Soiled Water	740	781

Lime (i.e. Ground Limestone)

Where the lime requirement is > 7.5 t/ha (3 t/acre), apply 7.5 t/ha (3 t/acre in year one), and the remainder after 2 years.

Total Requirement	89	tonnes

Total Fertilizers	**Tonnes**
Urea (46%N)	4.2
25-4-0	3.1
CAN (27%N)	6.6
50%K (MOP)	0.8
16% Super P	0.5

Straight N Fertilizers	**Tonnes**

P imported in concentrate feeds	100 kg

Chemical Fertilizer (kg nutrient)

	N	P	K
Max Allowed	4,539	200	-
Usage	4,462	198	398

					Nutrients Applied				Manures / Slurry		Fertilizer Products					Nutrient Advice*		
	Field Name	Crop	Area	Index		Lime	N	P	K	Cattle Slurry	Soiled Water	Urea (46%N)	25-4-0	CAN (27%N)	50%K (MOP)	16% Super P	N	P	K
			ha	P	K	t /acre	units /acre	units /acre	units /acre	gals/acre	gals/acre	bags/acre	bags/acre	bags/acre	bags/acre	bags/acre	units /acre	units /acre	units /acre
23	5001	Grazing	2.5	1	2	2	192	18	86	1500	5000	1.5	1.5	2			183	28	49
24	5002	Grazing	2.3	1	1	1.6	187	21	113	1500	10000	1.5	1.5	1			183	28	73
25	5003	1 Cut + Grazing	2.4	2	1	2	177	31	134	3000	3000	1.5	3				183	36	142
26	5004	1 Cut + Grazing	2.1	2	2	3	177	31	134	3000	3000	1.5	3				183	36	121
27	5005	1 Cut + Grazing	1.9	2	4	3	177	32	0			1.5		4		2	183	36	0
28	5006	Grazing	1.8	3	3	3.2	183	8	27		5000	1.5	1	2.5			183	12	24
29	5007	Grazing	2.6	3	2	0	177	0	0			1.5		4			183	12	49
30	5008	Grazing	2.3	3	3	0	183	8	27		5000	1.5	1	2.5			183	12	24
31	5009	1 Cut + Grazing + Reseed	1.7	4	4	0.8	177	0	25			1.5		4	0.5		183	0	24
32	5010	1 Cut + Grazing	2.8	4	3	1.2	177	0	100			1.5		4	2		183	0	97
33																			
34																			

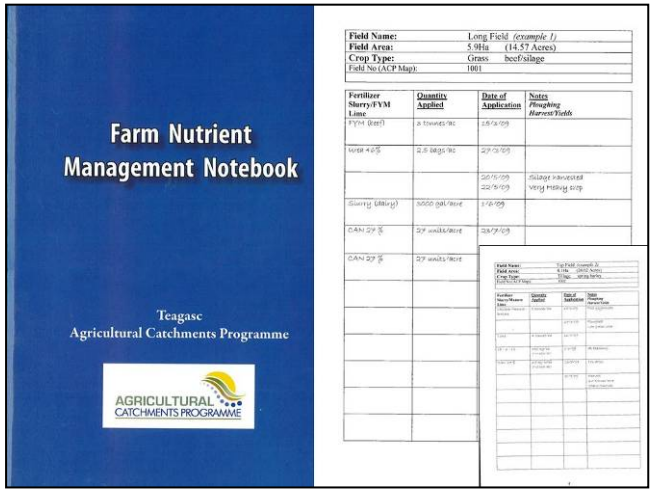
Livestock | Concentrate P | Storage Facilities | Fertiliser Plan | **Fertilizer Program** | Whole Farm Summary | RECORD Sheet | Derogation Report | Print

Ready NUM

Nutrient Management Advice

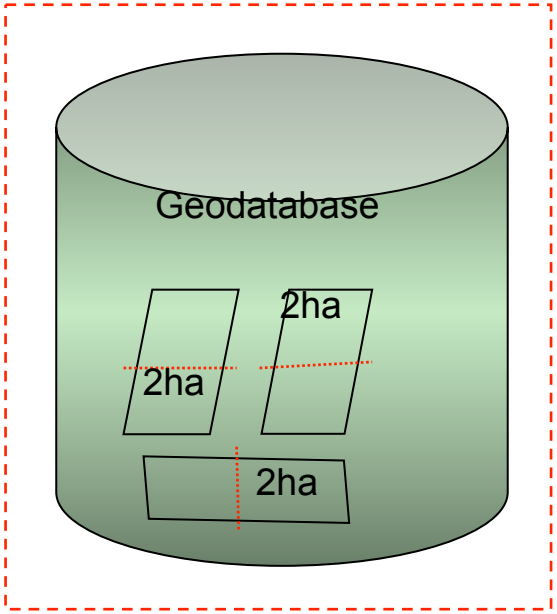
Nutrient Management Records

Soil Samples



Farm Nutrient Management Records (**NMR**)

Laboratory Information Management System (**LIMS**)



Digitised and geo-referenced fields/land management unit areas

Document Management System (**DMS**)

Nutrient Management Plan (NMP)

Benefits of this system

- Full utilisation of data through streamlining & visualisation
- Ability to overlay many years of data to track temporal changes in soil fertility & nutrient management
- Facilitates integration for geospatial analysis & other research against a wide variety of other datasets whilst maximising the integrity of the data
- Delivery of a workable ICT solution that is cost effective
- Better information for farmers – utilisation & interpretation

Thank You

Email: Catchments@teagasc.ie