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Nutrient Value of Slurry

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Factors affecting Nutrient Value of Slurry

Dry Matter

Dry matter	Nitrogen	Phosphate	Potash
%	**kg/m3** (units/1000 gallons)		
2	**0.6** (6)	**0.6** (5)	**1.5** (13)
6	**1.0** (9)	**1.2** (11)	**2.3** (20)
10	**1.4** (12)	**1.8** (16)	**3.0** (26)

Phosphate Availability – Soil Index

Index 0 or 1

0.6 kg/m^3 Phosphate (5 units P/1000 gallons)

Index 2- or above

1.2 kg/m^3 Phosphate (10 units P/1000 gallons)

Nitrogen Availability - Time & method of application

Spring Splash plate

0.9 kg/m^3 Nitrogen (8 units N/1000 gallons)

- Dribble bar/trailing shoe

1.0 kg/m^3 Nitrogen (9 units N/1000 gallons)

Summer

- Splash Plate

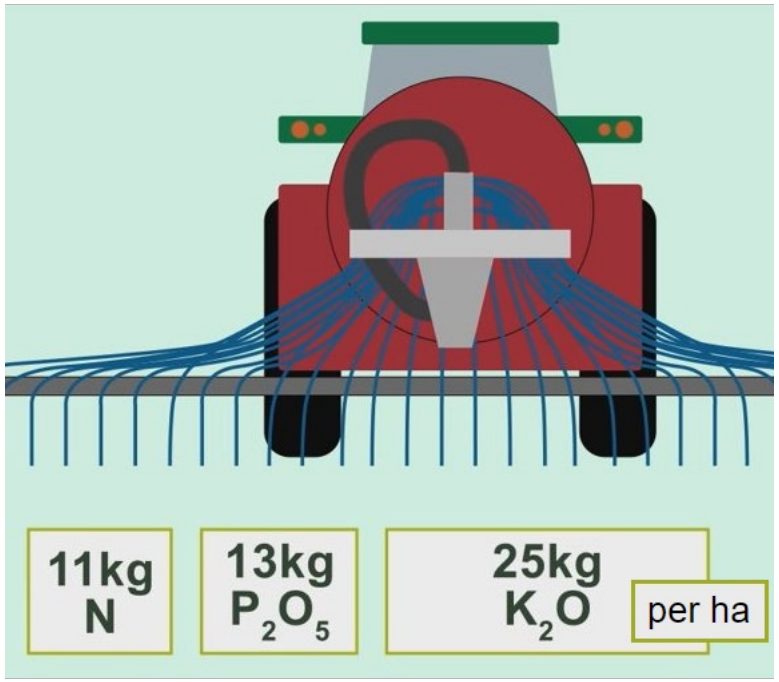
0.7 kg/m^3 Nitrogen (6 units N/1000 gallons)

- Dribble bar/trailing shoe

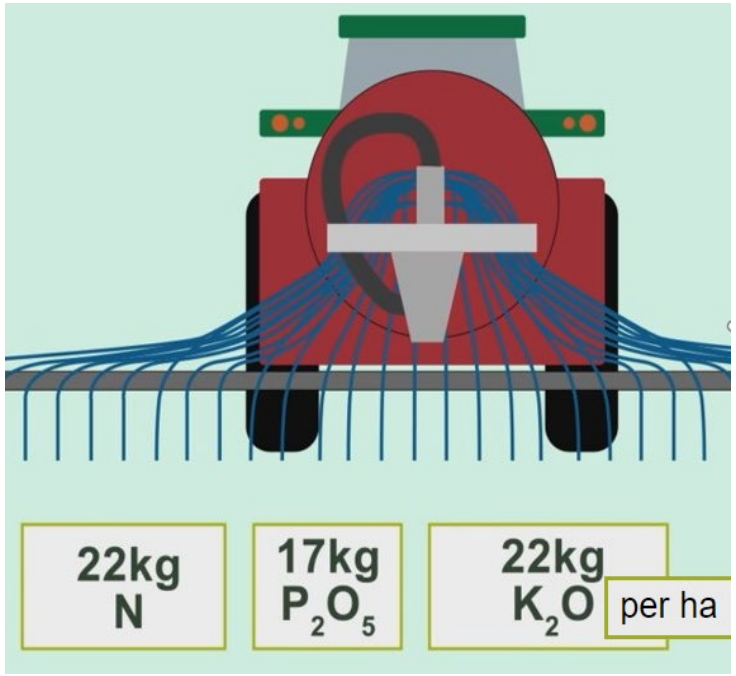
0.8 kg/m^3 Nitrogen (7 units N/1000 gallons)

Nutrient Value of Manures

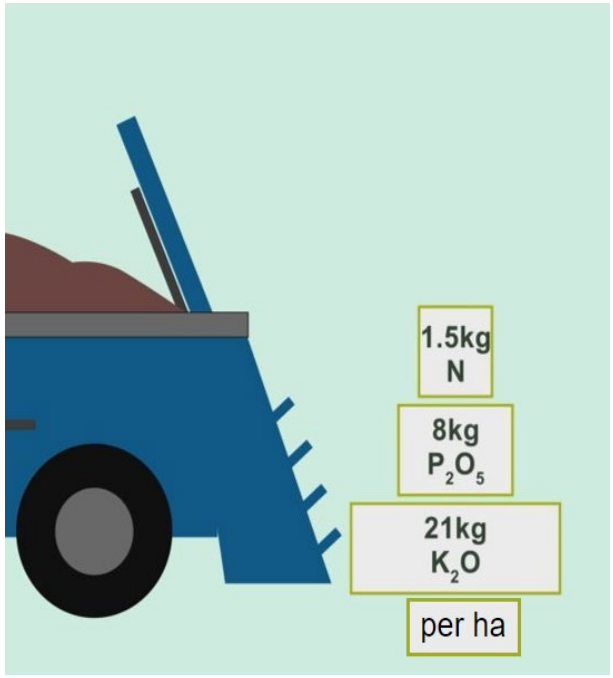
Cattle Slurry 6%DM
*11m3/ha (1000gal/ac)



Pig Slurry 4%DM
*11m3/ha (1000gal/ac)



Cattle Farmyard Manure 25%DM
2.5t/ha (1t/ac)



Equivalent bagged fertiliser units/ac	9.11.20	17.13.17	1.6.17

Applied in Spring, to P index 2- soil, *using LESSE

How valuable is your slurry?

Example: Cattle slurry, 6% Dry Matter

First cut silage nutrient requirements

Soil Index	Crop Phosphate (P) requirement	3000 gallons/ac supplies	Balance after slurry application	Crop Potash (K) requirement	3000 gallons/ac supplies	Balance after slurry application
	kg/ha					
1	70	20	50	110	95	15
2-	55	40	15	80	95	0
2+	40	40	0	60	95	0
3	20	40	0	30	95	0

Second cut silage nutrient requirements

Soil Index	Crop Phosphate (P) requirement	3000 gallons/ac supplies	Balance after slurry application	Crop Potash (K) requirement	3000 gallons/ac supplies	Balance after slurry application
	kg/ha					
1	25	16	9	100	78	22
2-	25	32	0	90	78	12
2+	25	32	0	60	78	0
3	0	32	0	40	78	0

Third cut silage nutrient requirements

Soil Index	Crop Phosphate (P) requirement	3000 gallons/ac supplies	Balance after slurry application	Crop Potash (K) requirement	3000 gallons/ac supplies	Balance after slurry application
	kg/ha					
1	15	16	0	80	78	2
2-	15	32	0	80	78	2
2+	15	32	0	40	78	0
3	0	32	0	20	78	0

Note: the availability of Phosphorus at Index 1 vs Index 2-

Maintaining soils at the optimum index means that the full requirement of the crop is supplied by slurry and no further chemical fertiliser is required, The above figures assume an optimum pH

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Practical Application of Slurry

Andrew Thompson, Technologist, CAFRE

Gareth Beacom, Beef & Sheep Adviser, CAFRE

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Slurry Spreading – What you need to know

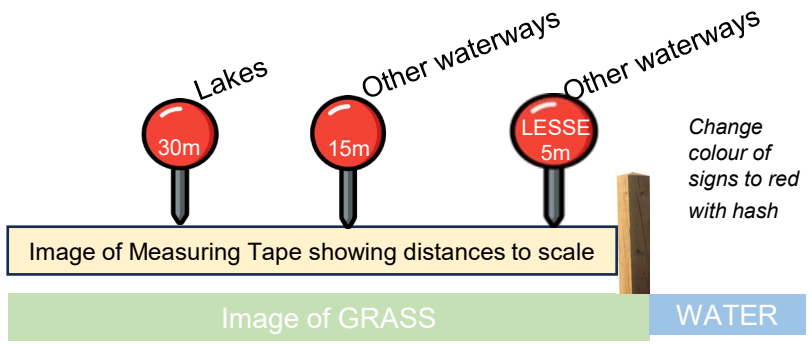
Buffer Zones for spreading slurry

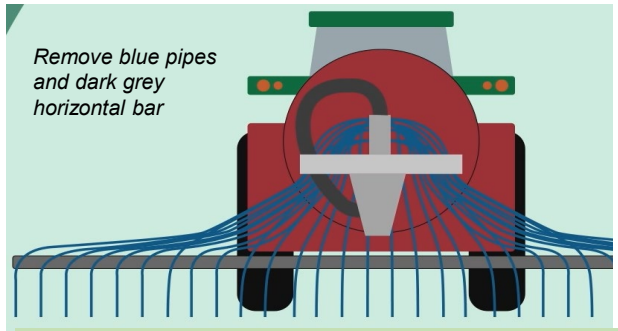
Organic manures (incl dirty water) must not be applied within:

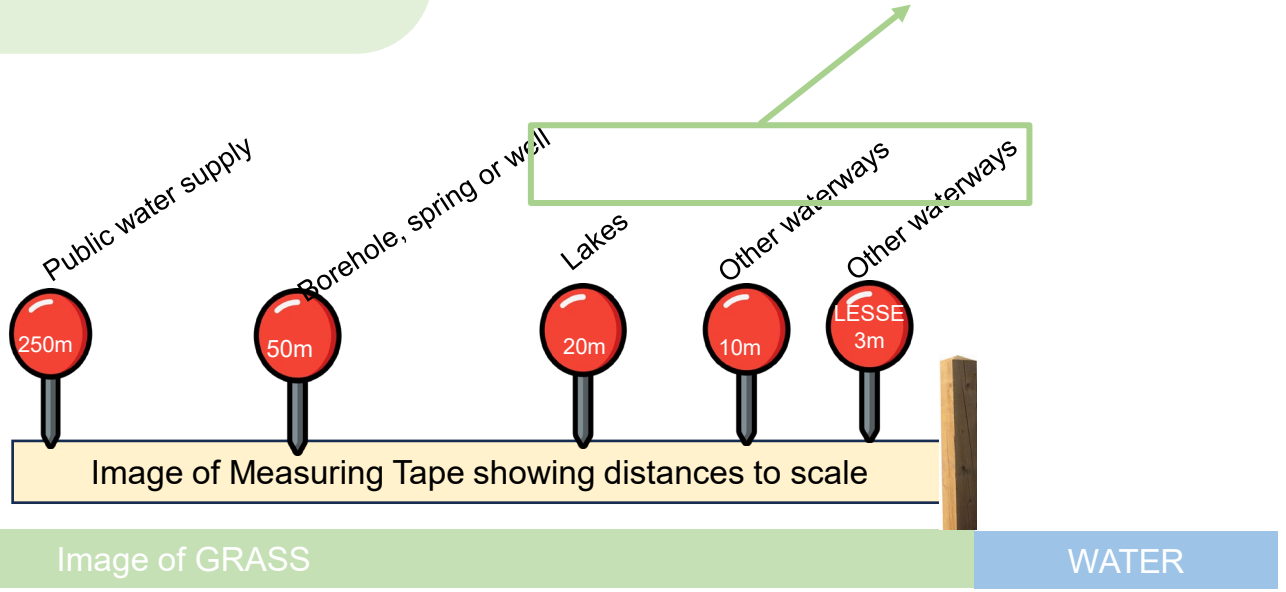
- **250m** of a borehole used for public water supply
- **50m** of a borehole, spring or well
- **20m** of lakes
- **10m** of a waterway other than lakes (reduced to **3m** when using LESSE)

(All types of chemical fertiliser must not be applied within 2m of any waterway)

Midnight 30th September – 15th October and during February
The buffer zones for spreading slurry are increased.







Slurry Spreading – What you need to know

Closed Period

Chemical Nitrogen & Phosphate fertilisers
Midnight 15 September – Midnight 31 January

Slurry, poultry litter, anaerobic digestate and other organic manures:
Midnight 15 October – Midnight 31 January

Farmyard manure:
Midnight 31 October – Midnight 31 January

Maximum Application Rates

Slurry: **50m³/ha (4,500gal/ac)** Reducing to **30m³/ha (2700 gal/ac)** from Midnight 30th September – 15th October and during February)

Solid organic manures: **50t/ha (20t/ac)**

Allow a minimum of **three weeks** between applications

Land Application Restrictions

All fertilisers, chemical and organic and including dirty water, must not be applied:

- on **waterlogged** soils, **flooded** land or land likely to flood

- on **frozen** ground or **snow covered** ground

- if **heavy rain** is forecast in the next 48 hours

- on **steep slopes** (with an average incline of 20% or more on grassland, 15% or more on all other land)

Application Rates

To calculate the required forward speed when spreading

Example: to apply 3000gal/acre (33m^3/ha) using a 3000gallon (13.5m^3) LESSE tanker, with a bandwidth of 7.5m, emptying in 4 minutes.

Step 1:

$$\text{Discharge rate } (m^3/sec) = \frac{\text{Volume of tanker } (m^3)}{\text{Time to empty tanker (sec)}} \quad \frac{13.5}{4 \times 60} = 0.056$$

Step 2:

$$\text{Forward Speed (km/hr)} = \frac{\text{Discharge rate } (m^3/sec) \times 36000}{\text{Bandwidth (m)} \times \text{Application rate } (m^3/ha)} \quad \frac{0.056 \times 36000}{7.5 \times 33} = 8 \text{ km/hr}$$

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Nutrient Management Planning

Rachel Megarrell, Beef & Sheep Adviser, CAFRE
Joe Casey, Technologist, CAFRE

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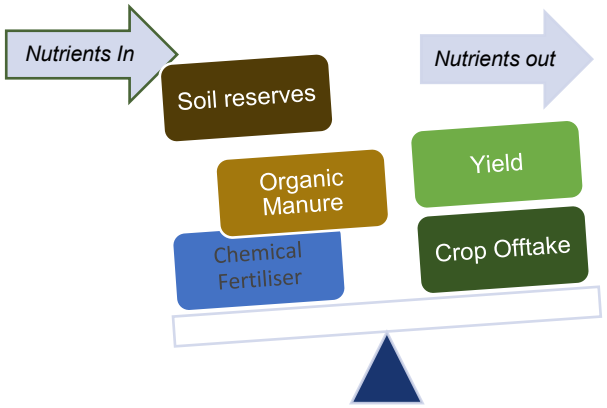
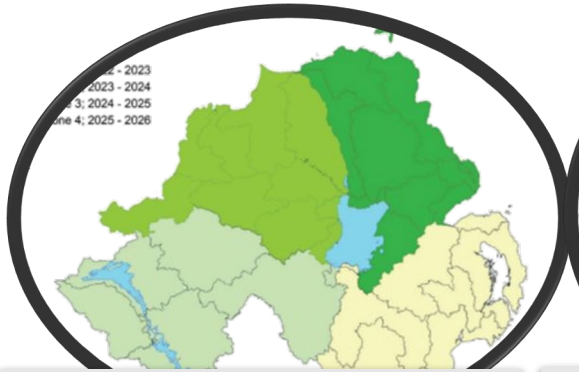
Nutrient management planning

Balancing nutrients supplied with nutrients required

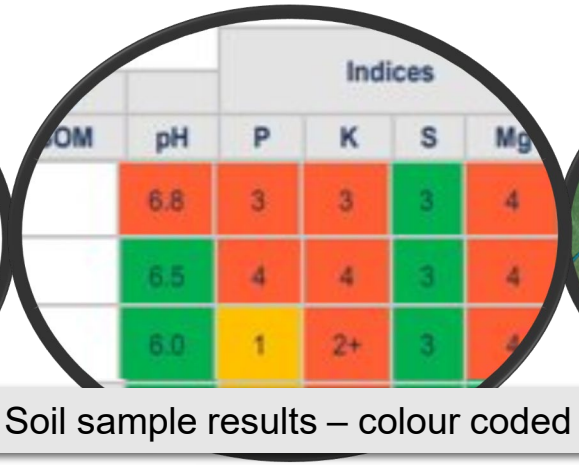


- Soil sample to determine soil nutrient reserves.
- Identify Excessive, Optimal and Deficient nutrient levels in soils. Correct soil pH.
- Optimise slurry value and prevent over application. Target slurry application to P and K deficient soils.
- Tailor fertiliser application.
- Optimise productivity and save money.
- Protect the environment from air and water pollution.

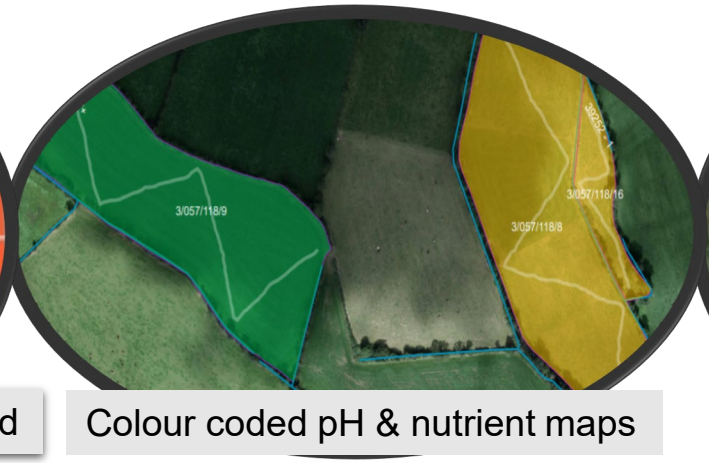
Nutrient Management – Soil Nutrient Health Scheme



Soil Nutrient Health Scheme



Soil sample results – colour coded



Colour coded pH & nutrient maps

Run off risk maps

- DAERA funded Soil sampling scheme.
- Colour coded soil results - pH, P, K, S, Mg, Ca, SOM
- Including fertiliser recommendations.
- Colour coded pH & nutrient maps.
- Run off risk maps.

SNHS Results & SNHS training package are useful decision support tools.

› Join SNHS online training

www.cafre.ac.uk/snhs-training

Soil Nutrient Health Scheme training: Understanding your soil analysis and how to create a Nutrient Management Plan.

Nutrient Management Planning in practice

Example 1.

Last Crop:	Grass high input (over 250kg N/ha)
Next Crop:	Silage 68-70D Silage [3 cut(s)]

	Indices			
pH	P	K	S	Mg
6.5	4	4	3	4

Silage Cut 1

	Nitrogen (N)	Phosphate (P_2O_5)	Potash (K_20)
Total Crop Requirement:	120.00 kg/ha *(96.00 units/acre)*	0.00 kg/ha *(0.00 units/acre)*	0.00 kg/ha *(0.00 units/acre)*
Organic Manure Nutrients:	0.00 kg/ha *(0.00 units/acre)*	0.00 kg/ha *(0.00 units/acre)*	0.00 kg/ha *(0.00 units/acre)*
Fertiliser Nutrients:	115.00 kg/ha *(92.00 units/acre)*	0.00 kg/ha *(0.00 units/acre)*	0.00 kg/ha *(0.00 units/acre)*
Nutrients to be Supplied:	**- 5 kg/ha** *(- 4 units/acre)* **(undersupplied)**	0 kg/ha *(0 units/acre)*	0 kg/ha *(0 units/acre)*

Organic Manure to be Applied

No organic manure specified

Fertiliser to be Applied

Fertiliser Type	Quantity of Product Applied
46 0 0	250 kg/ha

- pH 6.5 - no lime requirement.
- P index 4 excessive. Divert slurry elsewhere - risk of pollution.
- K index 4 excessive. Divert slurry elsewhere - prevent wasting nutrients.
- Nitrogen fertiliser only required for silage.
- **CAFRE Crop Nutrient Calculator**
  www.daera-ni.gov.uk/onlineservice

Colour coded pH & nutrient maps

Run off risk maps

Nutrient Management Planning in practice

Example 2

Last Crop:	Grass high input (over 250kg N/ha)
Next Crop:	Silage 68-70D Silage [3 cut(s)]

Indices				
pH	P	K	S	Mg
6.0	1	2+	3	4

Silage Cut 1

	Nitrogen (N)	Phosphate (P_2O_5)	Potash (K_20)
Total Crop Requirement:	120.00 kg/ha *(96.00 units/acre)*	70.00 kg/ha *(56.00 units/acre)*	60.00 kg/ha *(48.00 units/acre)*
Organic Manure Nutrients:	34.32 kg/ha *(27.46 units/acre)*	19.80 kg/ha *(15.84 units/acre)*	74.25 kg/ha *(59.40 units/acre)*
Fertiliser Nutrients:	82.40 kg/ha *(65.92 units/acre)*	46.00 kg/ha *(36.80 units/acre)*	0.00 kg/ha *(0.00 units/acre)*
Nutrients to be Supplied:	**- 3 kg/ha** *(- 2 units/acre)* **(undersupplied)**	**- 4 kg/ha** *(- 3 units/acre)* **(undersupplied)**	**+ 14 kg/ha** *(+ 11 units/acre)* **(oversupplied)**

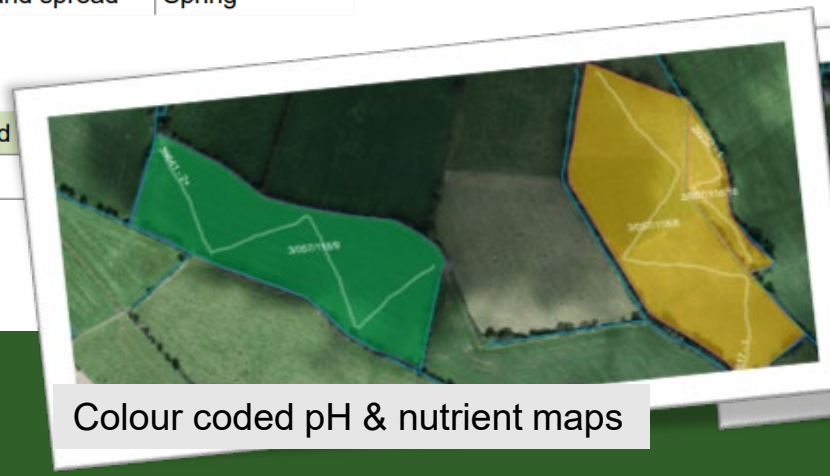
Organic Manure to be Applied

Manure Type	Volume Applied	Method of Application	When Applied
Dairy Cow Slurry 6% Dry Matter	33 m^3/ha	Slurry - Trailing shoe or Band spread	Spring

Fertiliser to be Applied

Fertiliser Type	Quantity of Product Applied
46 0 0	140 kg/ha
18 46 0	100 kg/ha

- pH 6.0 - Consider lime. Target is 6.2.
- P index 1 - Deficient. Target slurry here.
- K index 2+. Apply slurry to replace offtake. Non environmental pollutant.
- Targeting slurry helps meet crop requirements.
- N and P fertiliser top up required for silage.
- **CAFRE Crop Nutrient Calculator** www.daera-ni.gov.uk/onlineservices
- Field plan for all fields on farm = Nutrient Management Plan



Colour coded pH & nutrient maps

Run off risk maps

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Realtime Water Quality Monitor

Rachel Cassidy, Catchment Scientist, AFBI

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Nutrient Loss to Water

Care in timing and placement of slurry, manure and fertiliser is essential to minimise the potential for loss from land to water.

Steep slopes and soils with impeded drainage are vulnerable to runoff and losses during rainfall events.

A rainfall event lasting only a few hours can deliver a large proportion of the total annual loading of phosphorus to rivers and lakes.

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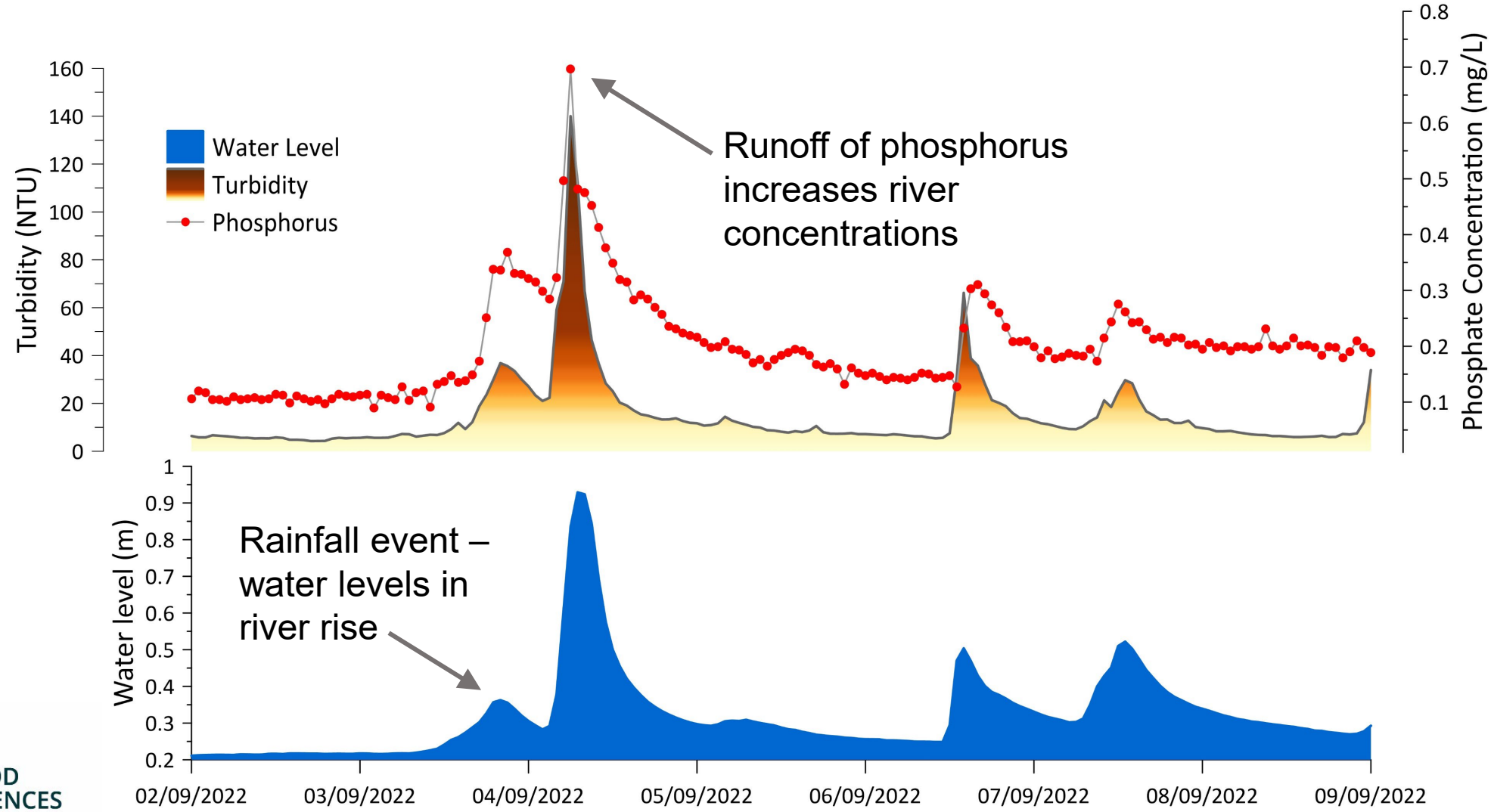
High resolution water quality monitoring shows the link between rainfall and loss of nutrients (particularly phosphorus).

High Concentration s + High Flows = Large Loads



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Rainfall on wet soil can lead to overland flow/runoff.

In our landscape these are the main pathways by which nutrients and sediment are transported to streams, rivers and onward to lakes and the sea.

Taking great care when applying nutrients in these areas can reduce the potential for loss and help ensure valuable nutrients remain in the soil for crop uptake.

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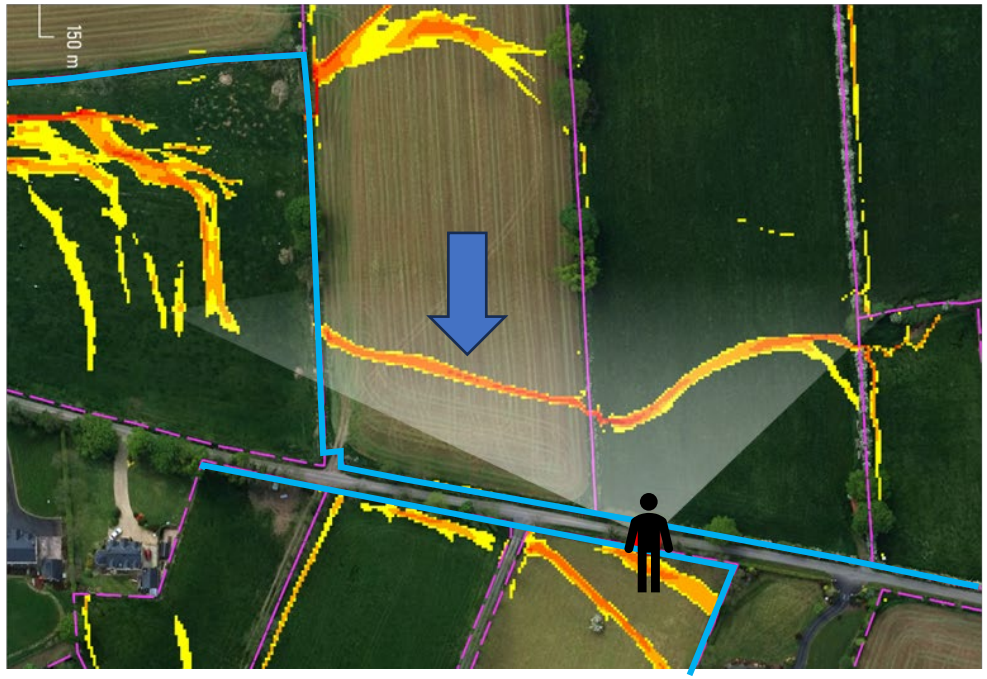


Water Quality Overview

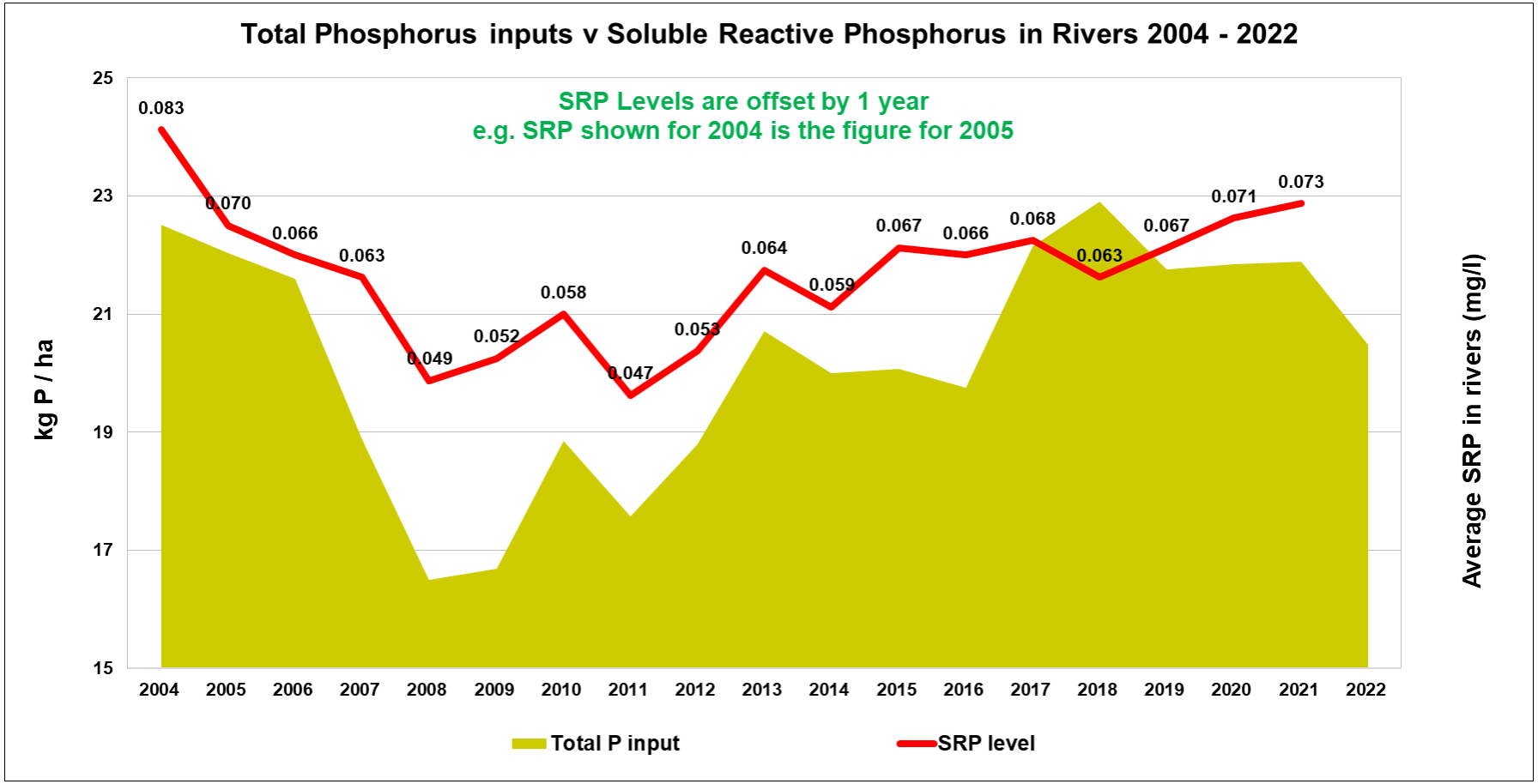
Gareth Greer, Northern Ireland Environment Agency

Department of
Agriculture, Environment
and Rural Affairs
www.daera-ni.gov.uk

Water Quality Overview - ‘What are the big issues?’

- Elevated levels of Phosphorus (P) are the main cause of poor water quality.
- Excess P causes algal growth in rivers and lakes and damage to habitats
- NI agriculture continues to operate at a significant P surplus.
- P inputs come from imported concentrate feeds and chemical fertilisers
- Over 40% of fields in NI were found to be above agronomic optimum P status.
- The Rephokus report indicates that there are approximately 6,000 tonnes of surplus P from animal manures per year.
- 62% of P inputs to NI rivers and lakes come from agriculture.
- P levels in rivers and lakes have been rising over past 10 years, as inputs of concentrate feed and fertilisers have increased.

Phosphorus input v Soluble Reactive Phosphorus in Rivers



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How you can help to improve Water Quality

- Nutrient Management Planning – use your SNHS results and run off risk maps
- Minimise Phosphorus inputs – meet P crop requirements from manures. Each tonne of concentrate feed contains approx. 5 kg of P.
- Eliminate chemical P fertiliser. Save money and help the environment.
- Only spread slurry and fertilisers when conditions are suitable.
- Use the CAFRE online tools to calculate your farm's Phosphorus balance and manure Nitrogen loading.
- Check your farmyard for slurry run off and sources of pollution
- Prevent cattle access to rivers causing erosion, sediment loss and pollution
- Follow the Nutrients Action Programme to farm efficiently.
- In future, consider sending slurry for processing to reduce your farm P surplus