



Technical Guidance for Assessment and Mitigation of Nutrient Impacts on the Natural Environment from Agricultural Development Planning Applications

Final report for Herefordshire Council

Ref: ID 101960

Ricardo ref. ED15419100

Issue: 1

7 February 2022

Customer:
Herefordshire Council

Customer reference:
ID 101960

Confidentiality, copyright and reproduction:

This report is the Copyright of Herefordshire Council and has been prepared by Ricardo Energy & Environment, a trading name of Ricardo-AEA Ltd under contract ED15419 dated 15/107/2021. The contents of this report may not be reproduced, in whole or in part, nor passed to any organisation or person without the specific prior written permission of Herefordshire Council. Ricardo Energy & Environment accepts no liability whatsoever to any third party for any loss or damage arising from any interpretation or use of the information contained in this report, or reliance on any views expressed therein, other than the liability that is agreed in the said contract.

Ricardo reference:
ED15419100

Contact:
Dave Freeman, Gemini Building, Fermi Avenue,
Harwell, Didcot, OX11 0QR, UK

T: +44 (0) 1235 753 403
E: dave.freeman@ricardo.com

Author:
Jessie Willcocks, Declan Sealy

Approved by:
Dave Freeman

Signed



Date:
7 February 2022

Ricardo is certified to ISO9001, ISO14001, ISO27001 and ISO45001.

Ricardo, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to as the 'Ricardo Group'. The Ricardo Group assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Ricardo Group entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.

Contents

1	GUIDANCE FOR SETTING UP A FARM DEVELOPMENT NUTRIENT BUDGET	1
1.1	BACKGROUND TO THE GUIDANCE	1
1.2	PURPOSE OF THE GUIDANCE	2
2	LOCATIONAL SCREENING	2
3	OVERVIEW OF THE PHOSPHORUS ASSESSMENT METHODOLOGY	4
4	SETTING UP FARMSCOOPER	6
4.1	DOWNLOADING FARMSCOOPER	6
4.2	USING FARMSCOOPER	6
4.2.1	Farmscoper tutorials:	6
5	GENERATING PHOSPHORUS VALUES	7
5.1	STAGE 1: GENERATING THE PRE-DEVELOPMENT BASELINE PHOSPHORUS OUTPUT	7
5.1.1	Information required before beginning the baseline pollutant losses	7
5.1.2	Stage 1 - Part 1: Constructing the farm	8
5.1.3	Stage 1 - Part 2: Generate the pre-development pollutant losses associated with the pre-development mitigation measures in place	8
5.2	STAGE 2: GENERATING THE PLANNING DEVELOPMENT APPLICATION PHOSPHORUS OUTPUT	9
5.2.1	Stage 2 - Part 1: Constructing the farm	9
5.2.2	Stage 2 - Part 2: Generate the proposed development pollutant losses associated with the proposed development mitigation measures in place	10
5.3	STAGE 3: GENERATING THE PLANNING APPLICATION PLUS ADDITIONAL MEASURES PHOSPHORUS OUTPUT	10
5.3.1	Stage 3 - Part 1: Constructing the farm	11
5.3.2	Stage 3 - Part 2: Generate the proposed development pollutant losses associated with the proposed development mitigation measures in place	11
5.4	WHAT IF YOUR MITIGATION MEASURE IS NOT LISTED WITHIN FARMSCOOPER	11
6	INFORMATION TO SUPPORT MITIGATION SELECTION	12

1 GUIDANCE FOR SETTING UP A FARM DEVELOPMENT NUTRIENT BUDGET

1.1 BACKGROUND TO THE GUIDANCE

Expansion of farming operations and associated developments often include complex and interrelated requirements and infrastructure development. These can include the need to seek planning consent, the complexity of these developments often require large amounts of supporting information to enable planning authorities to determine if planning consent can be awarded. Herefordshire Council has produced this Supplementary Planning Guidance to assist in the preparation of planning applications.

This document provides guidance on the assessment of agricultural phosphorus outputs. Following the Court of Justice of the European Union ruling known as the ‘Dutch Nitrogen Case’¹, mitigation to achieve ‘nutrient neutrality’ is required for new developments that would otherwise contribute additional nutrient loads to a European designated site that is close to unfavourable condition or in unfavourable condition due to nutrient pollution. Thus, all new developments that increase nutrient discharges to parts of a designated site that are close to or in unfavourable condition due to nutrient pollution must be able to demonstrate nutrient neutrality (no net additional losses of nutrient from the land holding and associated activities) in order to be compliant with the ‘Habitats Regulations’ as demonstrated through a Habitats Regulations Assessment (HRA). A Habitats Regulations Assessment (HRA) refers to the several distinct stages of assessment which must be undertaken in accordance with the Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017 to determine if a plan or project may affect the protected features of a habitats site before deciding whether to undertake, permit or authorise it². This is important as where there is potential for additional nutrients to be loaded into sensitive sites, such as the River Wye Special Area of Conservation (SAC), this can be a barrier to receiving planning consent for proposed developments.

This technical guidance document has been prepared to support agricultural development planning applications and guides applicants in the development and provision of evidence in support of their application. This information is required to determine any potential phosphorus impacts of new or replacement agricultural developments and any associated activities (for example the establishment of a new poultry unit with associated increase in poultry litter being applied to farmland in the vicinity of the development). It also provides useful information to officers of the council and other interested parties, local residents for example, on how the council expects the many planning considerations to be addressed when determining applications for planning permission.

This planning guidance document is supported by an Agricultural Development Input Template (Input Template), which captures information relevant to your current agricultural business structure as well as any changes expected under the proposed development. This guidance supports the assessment of phosphorus output levels through the Farmscoper modelling tool using the information you have entered in the Input Template. **Section A2.1** of the Input Template presents phosphorus values for the baseline, proposed development and planning application with any additional measures, which will be used within the Council’s assessment of your planning application. The filled in Input Template should be included as a document within your agricultural planning application to record baseline data for your farm and details of the proposed development, expected phosphorus outputs and allow for further assessment of values produced by the model if required.

¹ Joined Cases C-293/17 and C-294/17 Coöperatie Mobilisation for the Environment UA and Others v College van gedeputeerde staten van Limburg and Other

² Gov.UK (2019), Appropriate assessment: Guidance on the use of Habitats Regulations Assessment

1.2 PURPOSE OF THE GUIDANCE

This guidance provides a review to identify areas where increased phosphorus inputs through agricultural developments could cause impacts to the River Wye SAC. This is important as an excess of phosphorus can cause eutrophication of water sources leading to excessive growth of algae and plants which can adversely affect the water quality and damage aquatic ecology³.

An overview map (**Figure 1**) showing areas within the River Wye catchment requiring further assessment is presented in **Section 2** below. If potential phosphorus inputs could impact the River Wye then the guidance and tools described in this document will provide a baseline assessment of phosphorus for the existing farm structure and an assessment of phosphorus under the proposed planning application. This guidance also provides information on applying mitigation measures to the farm or proposed agricultural development, to reduce phosphorus loading to the River Wye SAC.

This guidance should be used as part of an agricultural planning application for any farm structure. It is a requirement to follow this guidance document and provide a copy of the completed Agricultural Development Input Template associated with this guidance, including phosphorus values provided by the Farmscoper tool and presented in **Section A2.1** of the Input Template, as part of your agricultural planning application. This includes any planning application for the like for like replacement of buildings and structures as well as applications for any new agricultural development requiring planning permission. It should be noted that permitted developments may also need to undertake this assessment where they may impact upon the loading of phosphorus to a designated site.

This document provides guidance on how to model the pollutant losses to the environment for your farm for these three key stages:

- Stage 1: Pre-development baseline
(Pre-development with pre-development mitigation measures)
- Stage 2: Planning development application
(Proposed development with proposed mitigation measures)
- Stage 3: Planning application plus additional measures
(Proposed development with proposed and additional mitigation measures)

2 LOCATIONAL SCREENING

Figure 1 presents an overview of the areas within Herefordshire County requiring further phosphorus assessment. The area presented in blue shows the catchment of the River Wye, selected at this scale due to the interconnected nature of the river and land within the catchment, where inputs to land and agricultural areas can have direct impacts to the River Wye and its upstream tributaries if not managed correctly. The area requiring further assessment is presented in blue.

Inside of blue area:

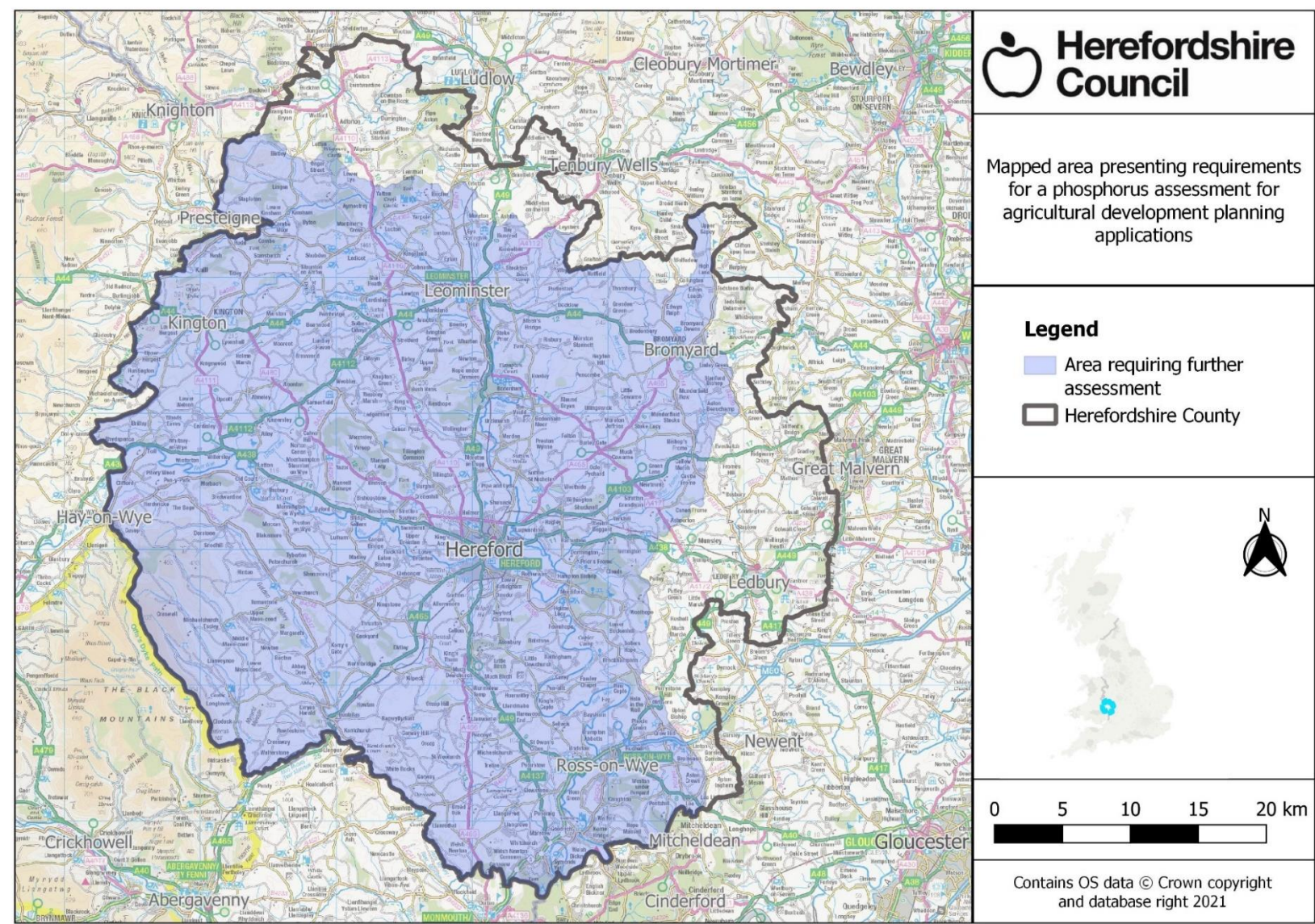
If the proposed area of your planning application is within this blue area you **ARE REQUIRED** to follow the phosphorus assessment methodology presented from **Section 3** below.

Outside of blue area:

If the proposed area of your planning application is outside of the blue area you will not need to complete a phosphorus assessment as detailed below. You are **NOT REQUIRED** to complete any further steps within this guidance document.

³ Environment Agency (2019), Phosphorus and Freshwater Eutrophication Pressure Narrative, Accessed at https://consult.environment-agency.gov.uk/++preview++/environment-and-business/challenges-and-choices/user_uploads/phosphorus-pressure-rbmp-2021.pdf

Figure 1: Overview map of areas requiring further phosphorus assessment



3 OVERVIEW OF THE PHOSPHORUS ASSESSMENT METHODOLOGY

As part of the phosphorus assessment, data on the current farm and proposed development will be input to Farmscopers V5, a freely available Microsoft Excel tool built by ADAS Ltd. It enables the generation of nutrient export estimates for eight different farm types, including dairy, beef, sheep, indoor pigs, outdoor pigs, poultry, imported manure and cropping.

The steps to attain values to support your planning application, as presented in this guidance and associated input template, are as follows:

- Step 1** Follow guidance in **Section 4** below to download the Farmscopers tool and find climate and soil type information for the location of your proposed development.
- Step 2** Input data for the current farm baseline and proposed changes under the development in **Sections A1.1-A1.6** of the Input Template document.
- Step 3** Follow guidance in **Section 5.1** below to input data to Farmscopers and generate the Stage 1: Pre-development baseline phosphorus values.
- Step 4** Follow guidance in **Section 5.2** below to input data to Farmscopers to generate the Stage 2: Planning development application phosphorus values.
- Step 5** If the individual phosphorus (kg) output value is higher under Stage 2 (Planning development application) than Stage 1 (pre-development), then additional mitigation measures will need to be included to support the planning application. These should be implemented to decrease phosphorus emissions and to bring them below or equal to that of the current farm enterprise (Stage 1: Pre-development). Additional measures should be selected in **Section A1.6** of the Input Template.
Follow guidance in **Section 5.3** below to input data to Farmscopers to generate the Stage 3: Planning application plus additional mitigation measures phosphorus values. The individual phosphorus (kg) output from Farmscopers should be input to **Section A2.1** of the Input Template document. For guidance sources on the mitigation practices please see **Section 6** below.
- Step 6** Ensure Farmscopers output values are included for both Stage 1 and Stage 2 within **Section A2.1** of the Input Template document. Ensure Stage 3 values are included if it is necessary for additional measures to be implemented.
Attach the document to your agricultural planning application to support a Habitats Regulation Assessment (HRA).

A decision flow chart of these steps is also presented in **Figure 2** below.

The following sections provide information:

Section 4.1: Where and how to download Farmscopers V5

Section 4.2: Online tutorial with information on using Farmscopers

Section 5.1.1: Climate and soil type information requirements

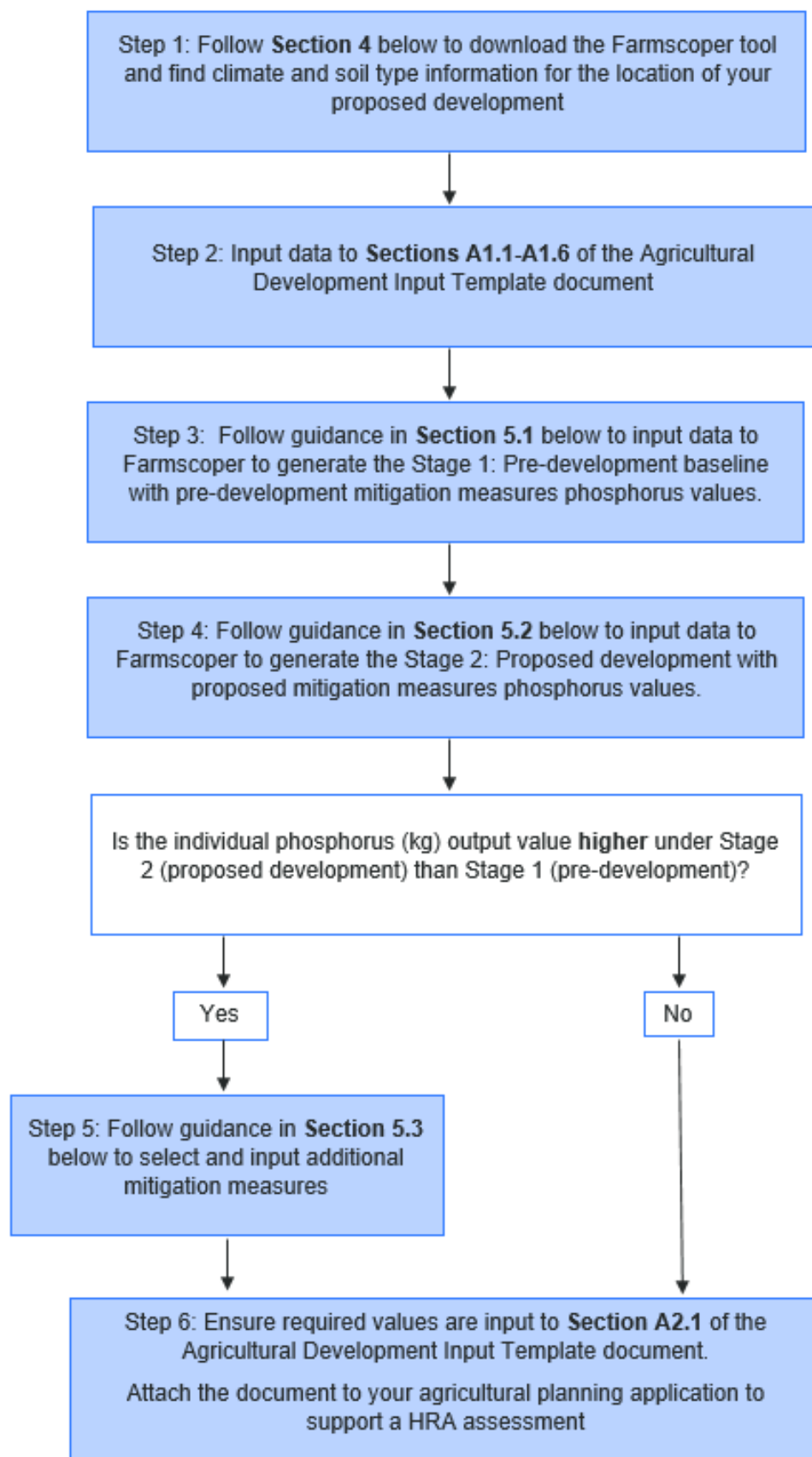
Sections 5.1.2 and 5.1.3: How to model the current farm baseline phosphorus pollutant level

Section 5.2: How to model the farm phosphorus pollutant level under the proposed planning application

Section 5.3: How to model the farm phosphorus pollutant level under the proposed planning application with additional mitigation measures

Section 6: Information to support mitigation selection

Figure 2: Phosphorus assessment requirements decision flow chart



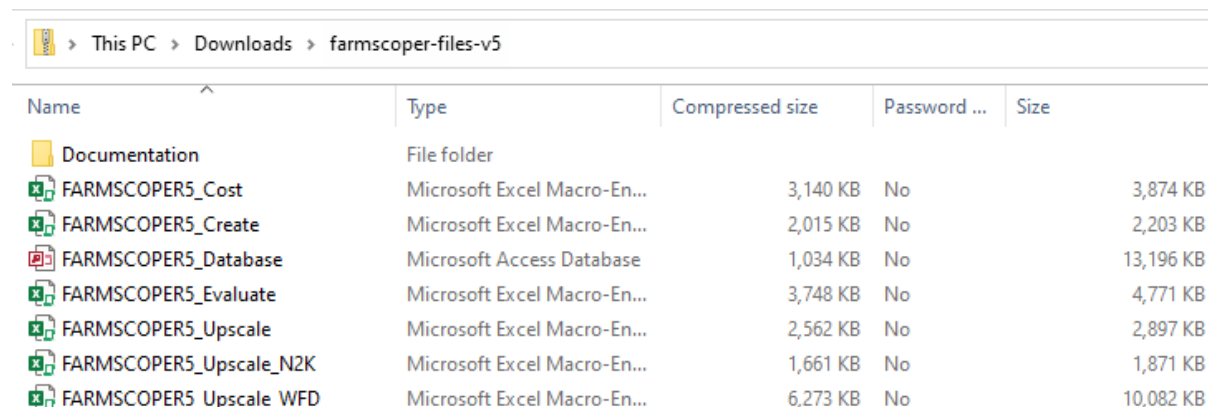
4 SETTING UP FARMSCOPER

4.1 DOWNLOADING FARMSCOPER

Farmscoper is available for download at this web address: <https://adas.co.uk/services/farmscoper/>. The current version available for download is V5. Downloading the Farmscoper V5 files will require 28.2MB of space on your computer.

*Note: Farmscoper doesn't install as a program as it is a tool built in Microsoft Excel, an icon is not created to be found on your desktop or on the programme menu. The files that are used for calculating nutrient export coefficients can be found in the 'Farmscoper-files-v5' folder. On a Windows computer, the default location is the 'Downloads' folder on the main drive. **Figure 3** shows the default location of the Farmscoper files on a Windows computer and the names of the different files which contain the tools needed for this assessment.*

Figure 3: The default location of Farmscoper on a Windows computer and the different files which contain the different tools



Name	Type	Compressed size	Password ...	Size
Documentation	File folder			
FARMSCOPER5_Cost	Microsoft Excel Macro-En...	3,140 KB	No	3,874 KB
FARMSCOPER5_Create	Microsoft Excel Macro-En...	2,015 KB	No	2,203 KB
FARMSCOPER5_Database	Microsoft Access Database	1,034 KB	No	13,196 KB
FARMSCOPER5_Evaluate	Microsoft Excel Macro-En...	3,748 KB	No	4,771 KB
FARMSCOPER5_Upscale	Microsoft Excel Macro-En...	2,562 KB	No	2,897 KB
FARMSCOPER5_Upscale_N2K	Microsoft Excel Macro-En...	1,661 KB	No	1,871 KB
FARMSCOPER5_Upscale_WFD	Microsoft Excel Macro-En...	6,273 KB	No	10,082 KB

4.2 USING FARMSCOPER

4.2.1 Farmscoper tutorials:

A number of tutorial videos are also available on the Farmscoper website⁴. These videos can be used to learn how to run the Farmscoper tool. It is recommended that all of the introductory videos are downloaded and viewed, although the three videos that will provide the most relevant guidance are:

1. [Calculating Baseline Pollutant Losses for a Farm⁵](#)
2. [Customising farm systems⁶](#)
3. [Calculating impacts of Mitigation Methods for a Farm⁷](#)

An explanation of the process for running Farmscoper to generate nutrient export coefficients is provided below.

⁴ See: <https://adas.co.uk/services/farmscoper/>

⁵ See: https://adas.co.uk/wp-content/uploads/2021/04/Calculating_Baseline_Pollutant_Losses_for_a_Farm-1.avi

⁶ See: https://adas.co.uk/wp-content/uploads/2021/04/Customising_Farm_Systems-1.avi

⁷ See: https://adas.co.uk/wp-content/uploads/2021/04/Calculating_Impacts_of_Mitigation_Methods_for_a_Fa-1.avi

5 GENERATING PHOSPHORUS VALUES

5.1 STAGE 1: GENERATING THE PRE-DEVELOPMENT BASELINE PHOSPHORUS OUTPUT

The pre-development baseline pollutant losses to the environment associated with the farm need to be calculated to provide a baseline value of the current pollutant losses. This is a two-step process that is to be completed using the Farmscoper V5 application. The first stage involves 'building' the user's farm and generating pollutant values without mitigation measures. The second stage involves selecting the mitigation measures relevant to the user's current farming practice in order to generate the best estimate of the current, pre-development, pollutant losses to the environment.

5.1.1 Information required before beginning the baseline pollutant losses

The data inputs required for the Farmscoper tool are found below with guidance on how to obtain this information if unknown.

1. Climate information (received annual rainfall volume at the site):
 - a. Go to this link: <https://nrfa.ceh.ac.uk/data/station/spatial/55023>. This link will bring the user to the Wye at Redbrook flow gauge catchment information page.
 - b. Click on the dropdown list next to the title 'Select spatial data type to view:' on the left of the map and select 'Rainfall'. Next select the Legend tab.
 - c. Zoom in on the map to find the location of the development and find the corresponding rainfall range from the Legend.
 - d. Select the corresponding Farmscoper rainfall band (an annual rainfall of 675.1 – 700 would be in the 600 – 700mm Farmscoper band; 1400.1 – 1600 is in the > 1500 mm band etc.) in **Section A1.2** of the Input Template.
2. Soil Type (the predominant soil drainage characteristics at the site if the user is unsure):
 - a. Go to this link: <http://www.landis.org.uk/soilscapes/#>
 - b. Find the specific area of the development on the map by using the search bar on the right side of the map in the 'Search' tab or zooming to the site on the map. Searching an area will generate a pop-up window in which you can view the soil information by clicking 'View soil information'. If this is not an option then click on the relevant soil type on the map and click on the 'Soil information' tab on the right-hand side of the map, below the 'Search' tab.
 - c. The 'Soil drainage type' value can be found in the 'Soil information' under the title 'Drainage:'.
 - d. See **Table 1** to convert soil type to Farmscoper equivalent.
3. Further detailed farm information is also required, further information is included in the Input Template. The steps in Sections A1.1-A1.6 need to be completed before beginning the input to the Farmscoper Tool.

Table 1: Soilscape drainage term equivalent

Soilscape drainage term	Farmscoper term	Definition
Freely draining	FreeDrain	Free Draining
Slightly impeded drainage	DrainedAr	Drained for arable
Impeded drainage	DrainedArGr	Drained for arable and grassland
Variable	DrainedArGr	Drained for arable and grassland
Surface Wetness	DrainedArGr	Drained for arable and grassland
Naturally wet	FreeDrain	Free Draining

5.1.2 Stage 1 - Part 1: Constructing the farm

The Farmscoper Create tool must be used in order to generate the required input values for your farm. The general guidance for input is described below. Video 2 'Customising farm systems'⁸ from ADAS Ltd can be used alongside the steps below as an aid to help.

Running the Farmscoper Create tool requires the following steps:

1. Input data for the current farm baseline and proposed development to **Sections A1.1-A1.5** of the Input Template document. This Input Template provides input tables covering the farm types listed within Farmscoper and reflects the Farmscoper input tables. Instructions on inputting data are included within the Input Template. It should be noted that some tables will not be relevant to your farm and agricultural development, if not relevant these tables/cells should be left blank.
2. Open 'FARMSCOPER5_Create' (as seen in **Figure 3**) and save a copy in a suitable location with a meaningful name, e.g. 'FARMSCOPER5_Create_Stage 1'.
3. Copy and paste the 'FARMSCOPER5_Database' (**Figure 3**) into the same folder/location as the 'Create' file.
4. Navigate to the 'Control' worksheet/tab in the 'Create' file. To switch between worksheets click on the tabs along the bottom of the opened excel file.
5. Select 'Climate' by selecting a rainfall band within the box next to the map of England. This value is based on the climate information steps described in **Section 5.1.1** above. This value will remain the same throughout.
6. Select a 'Soil Type' and an associated 'Drain Status' if necessary. This value is based on the soil type information steps described in **Section 5.1.1** above. This value will remain the same throughout.
7. Select the 'Blank Farm' type and click 'Customise Farm'. This will take the user to the 'Farm' tab/worksheet. To switch between worksheets click on the tabs along the bottom of the opened excel file.
8. Enter the baseline information from **Sections A1.1-A1.5** of the Input Template (highlighted by a green column header colour) within the corresponding orange or tick box cells in Farmscoper. Tables within the input template should directly correspond to tables within the Farmscoper 'Farm' tab.
9. Click 'Build Farm', near the top of the worksheet, to generate the pollutant losses without mitigation measures in place.
10. Save the Farmscoper 'Create' document. It is important to save each Farmscoper file for each stage of this assessment to provide a record of the data input and output.

5.1.3 Stage 1 - Part 2: Generate the pre-development pollutant losses associated with the pre-development mitigation measures in place

The Farmscoper Evaluate tool is used to generate the estimated 'baseline' pollutant losses from your farm. Farmscoper Evaluate includes a total of 115 mitigation measures which may be relevant to your farm. However, only 72 of these are relevant to phosphorus pollution and are therefore the only measures to be included in **Section A1.6** of the Input Template, also presented in **Section 6** below. This template is used to help define your farm and aid with data collection and entry into the Farmscoper tool, it is required to support the planning application to give clarity on the definition of your farm enterprise.

Phosphorus mitigation measures currently undertaken by the farm should be entered into **Section A1.6** of the template document. Before entering the mitigation methods relevant to the farm to Farmscoper the user should turn off all mitigation measures and set the percentage implementation to zero (see steps 5 and 6 below).

Running the Farmscoper Evaluate tool requires the following steps:

⁸ See: https://adas.co.uk/wp-content/uploads/2021/04/Customising_Farm_Systems-1.avi

1. Input data for the current farm baseline to **Sections A1.6** of the Input Template document. Instructions on inputting data are included within the Input Template.
2. Open 'FARMSCOPER5_Evaluate' (as seen in **Figure 3**) and save a copy in the same folder/location as the 'Create' file. Saving the file with a meaningful name, e.g. 'FARMSCOPER5_Evaluate_Stage 1'.
3. Navigate to the 'Control' tab/worksheet.
4. Click the 'Load Create Data' button in Box 1 and select the completed 'Create' file which contains your farm information from Part 1 in **Section 5.1.2** above.
5. Click 'Select Method List' in Box 2 of the 'Control' worksheet. This will bring the user to the 'Method List' tab/worksheet.
6. Set all of the mitigation methods to 'FALSE' in the 'Active' Column (Column I).
7. Set the 'Prior Implementation' and 'Maximum Implementation' columns (Columns J and K) to 0 (zero).
8. Set the mitigation measures currently implemented as a measure on your farm to active (Column I) and the percentage of your farm area for which they are implemented in the 'Maximum Implementation' column (Column K), according to what was reported in Column A of **Section A1.6** of the Input Template.
9. Make sure that the correct methods have been set to active and all of the methods are set to zero in the 'Prior Implementation' column.
10. Navigate back to the 'Control' tab/worksheet and click 'Evaluate Methods Together' and wait for the tool to run.
11. After receiving notification that the tool has successfully finished processing, click 'OK'. The user must then navigate to the 'Output' worksheet tab and make note of the phosphorus export located within cell H4 under the 'Set' row and 'Phosphorus (kg)' column. This value should be entered into the correct Stage 1 location in **Section A2.1** of the Input Template.
12. Save the Farmscoper 'Evaluate' document.

5.2 STAGE 2: GENERATING THE PLANNING DEVELOPMENT APPLICATION PHOSPHORUS OUTPUT

This stage requires the user to model the on-farm, planning development application changes with the proposed mitigations measures in place using Farmscoper. This process is almost the same as Stage 1. However, the key difference is including the proposed development changes to the farm and mitigation measures. A high-level overview can be seen below. For further guidance on how to operate Farmscoper correctly, revisit Stage 1 and the videos at ADAS Ltd⁹Error! Bookmark not defined..

The Stage 2 proposed planning proposal should be entered into the relevant 'under proposed development' cells of **Sections A1.1-A1.5** of the Input Template (highlighted by a yellow column header colour), this will help you to define how to best represent the planning application within Farmscoper. This should include both the proposed infrastructure (where applicable) and also all associated changes to farm operation such as livestock numbers, manure and slurry management and any mitigation measures that will be associated with the proposals. These steps provide the evidence to assess if the proposal is nutrient neutral as required under the Habitats Regulations.

5.2.1 Stage 2 - Part 1: Constructing the farm

1. Open the 'Create' file created and saved in Stage 1 and resave your farm specific 'Create' file with an appropriate new name, e.g. 'FARMSCOPER5_Create_Stage 2'.
2. Navigate to the 'Farm' tab/worksheet. To switch between worksheets click on the tabs along the bottom of the opened excel file.
3. Edit the Create file to include the proposed development farm information according to information entered into **Sections A1.1-A1.5** of the Input Template (highlighted by a yellow column header colour) so it captures the on-farm changes associated with the development.

⁹ See: https://adas.co.uk/wp-content/uploads/2021/04/Customising_Farm_Systems-1.avi

Please note, not all cells will require changes, only those relevant to changes expected under the planning development application.

4. Save the Farmscoper 'Create' document.

5.2.2 Stage 2 - Part 2: Generate the proposed development pollutant losses associated with the proposed development mitigation measures in place

1. Open 'FARMSCOPER5_Evaluate' (as seen in **Figure 3**) and save a copy in the same folder/location as the 'Create' file. Saving the file with a meaningful name, e.g. 'FARMSCOPER5_Evaluate_Stage 2'.
2. Navigate to the 'Control' tab/worksheet.
3. Click the 'Load Create Data' button in Box 1 and select the completed 'Create' file for Stage 2 which contains your farm information from Part 1 in **Section 5.1.2** above.
4. Click 'Select Method List' in Box 2 of the 'Control' worksheet. This will bring the user to the 'Method List' tab/worksheet.
5. Set all of the mitigation methods to 'FALSE' in the 'Active' Column (Column I).
6. Set the 'Prior Implementation' and 'Maximum Implementation' columns (Columns J and K) to 0 (zero).
7. Set the mitigation measures as active according to Column B (total of the currently implemented and proposed to be implemented under the planning development measures) of **Section A1.6** of the Input Template. Input the percentage of your farm area for which they will be implemented in the 'Maximum Implementation' column (Column K). Note, this requires both the current and proposed mitigation measures to be input. If a proposed mitigation measure is to increase the percentage farm area of an already implemented measure, make sure the percentage reflects this increase to farm area, e.g. percentage recorded = existing + proposed additional implementation to farm area.
8. Make sure that the correct methods have been set to active and all of the methods are set to zero in the 'Prior Implementation' column.
9. Navigate back to the 'Control' tab/worksheet and click 'Evaluate Methods Together' and wait for the tool to run.
10. After receiving notification that the tool has successfully finished processing, click 'OK'. The user must then navigate to the 'Output' worksheet tab and make note of the phosphorus export located within cell H4 under the 'Set' row and 'Phosphorus (kg)' column. This value should be entered into the correct Stage 2 location in **Section A2.1** of the Input Template.
11. Save the Farmscoper 'Evaluate' document.

5.3 STAGE 3: GENERATING THE PLANNING APPLICATION PLUS ADDITIONAL MEASURES PHOSPHORUS OUTPUT

This stage supports the user to identify any additional mitigation measures that could be implemented to further reduce emissions to ensure the phosphorus outputs of the farm are the same or below the current baseline. Stage 3 of this guidance helps you to produce the evidence required in support of an assessment as required under the Habitats Regulations. Outputs from farmscoper, to be input to **Section A2.1**, should be submitted in support of a planning application where required. If your phosphorus outputs in Stage 2 (under the proposed developments) are above those listed in Stage 1 (current farm baseline pre-development) you should select additional mitigation measures and complete Stage 3 steps below. If your Stage 2 outputs are equal to or below the Stage 1 phosphorus outputs you do not need to complete Stage 3 steps. A decision flow chart is presented in **Figure 2**.

To select further measures, the list of phosphorus mitigation measures pre-set within Farmscoper are presented in **Section A1.6** of the Input Template. To understand more about what these measure entail and how to implement them please review the supporting sources presented in **Section 6** below. The steps for generating Stage 3 phosphorus output values are explained below. For further guidance on how to operate Farmscoper, revisit Stage 1 and Stage 2 steps and the videos on the ADAS website¹⁰.

¹⁰ See: https://adas.co.uk/wp-content/uploads/2021/04/Customising_Farm_Systems-1.avi

5.3.1 Stage 3 - Part 1: Constructing the farm

1. Open the 'Create' file created and saved in Stage 2 and resave your farm specific 'Create' file with an appropriate new name, e.g. 'FARMSCOPER5_Create_Stage 3'. As the farm information for the proposed development will remain the same this file is a direct copy of data entered for Stage 2.

5.3.2 Stage 3 - Part 2: Generate the proposed development pollutant losses associated with the proposed development and additional mitigation measures in place

1. Open the 'Evaluate' file created in Stage 2 and re-save (Save As) the evaluate file with an appropriate new name, e.g. 'FARMSCOPER5_Evaluate_Stage 3'.
2. Edit the mitigation measures within the 'Method List' tab/worksheet to include all of the mitigation options selected for Stage 3 as detailed in Column C in **Section A1.6** of the Input Template. Note, this requires both the current, proposed and additional mitigation measures to be input. If an additional mitigation measure is to increase the percentage farm area of an already implemented measure (included in Column B of the table in **Section 6** of the Input Template), make sure the percentage reflects this increase to farm area, e.g. percentage recorded = existing + proposed + additional implementation to farm area.
3. Run the new, post-development with additional measures farm scenario by clicking the 'Evaluate Methods Together' button located within the 'Control' tab/worksheet.
4. After receiving notification that the tool has successfully finished processing, click 'OK'. The user must then navigate to the 'Output' worksheet/tab and make note of the phosphorus export located within cell H4 under the 'Set' row and 'Phosphorus (kg)' column. This value should be entered into the correct location in **Section A2.1** of the Input Template.
5. Save the Farmscoper 'Evaluate' document.

5.4 WHAT IF YOUR MITIGATION MEASURE IS NOT LISTED WITHIN FARMSCOPER

There are an array of pre-defined mitigation measures related to phosphorus within the Farmscoper Evaluate tool. However you may want to include a measure which is not included within Farmscoper as part of your planning application assessment, this guidance does not provide details of how to add additional mitigation measures to the Farmscoper model. If you plan to use mitigation measures outside of those included in farmscoper, you will be required to demonstrate the impact this would have on the potential phosphorous loading that would result from the proposal.

To include an alternative mitigation measure as part of your planning application you will need to provide thorough evidence of the efficacy of the mitigation measure and its applicability to your farm and proposed development. Information to provide includes:

1. Details of the alternative mitigation measures, and their phosphorus reduction potential. This should include a defined reduction value (i.e. 0.5kg reduction per m²) and should come from a reputable source, ideally from peer reviewed research, such as a scientific journal article or a governmental publication.
2. Details of the data source used for the reduction value, including either a reference or weblink.
3. Details of how the measure would be implemented on the farm as well as the extent the measure is currently implemented or is proposed to be implemented.
4. The expected phosphorus reduction value for your farm using this measure.

Details of these additional measures can be used against the information provided from the farmscoper model to provide evidence of nutrient emissions against the pre-planning baseline. This information should be submitted alongside a filled-out version of Input Template as part of your planning application to be reviewed by Herefordshire Council.

6 INFORMATION TO SUPPORT MITIGATION SELECTION

A list of online sources providing further information and guidance on mitigation measures relevant to agricultural phosphorus reductions, including information on their implementation, which could be useful for your planning application are detailed in **Table 2** below.

Regulations or guidance relating to each mitigation measure included within Farmscoper are presented in **Table 3** below (represented by a Y). Relevant guidance or regulations for mitigations presented within Farmscoper includes Farming Rules for Water (FRfW), Storing Silage and Agricultural Fuel Oil (SSAFO), Nitrate Vulnerable Zones (NVZ), Countryside Stewardship (CS) and Catchment Sensitive Farming (CSF). Mitigation measures are expected to be applied in line with the relevant regulation or guidance, e.g. a 12m to 24m watercourse buffer strip on cultivated land for mitigation '14. Establish riparian buffer strips', in line with Countryside Stewardship guidelines¹¹.

There are some mitigation measures (those without a Y) included which do not link to the regulations or guidance listed, such as better health planning for animals. These should be adopted following reasonable guidance, e.g. working with your vet to create an animal health plan.

Table 2: Sources of guidance and information to support mitigation selection

Source	Title	Link
Gov.UK	Farming rules for water (Relevant from 2 April 2018 for all farmers in England)	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/695598/farming-rules-for-water-policy-paper-v2.pdf
Gov.UK	Countryside Stewardship (Current agri-environment scheme information)	https://www.gov.uk/government/collections/countryside-stewardship
Gov.UK	Environment Land Management (ELMs) schemes: <ul style="list-style-type: none"> - Sustainable Farming Incentive - Local nature Recovery - Landscape Recovery (Launching between 2022-2024, with the full range of schemes available from 2025)	https://www.gov.uk/government/publications/environmental-land-management-schemes-overview/environmental-land-management-scheme-overview
Gov.UK	Sustainable Farming Incentive: how the scheme will work in 2022	https://www.gov.uk/government/publications/sustainable-farming-incentive-how-the-scheme-will-work-in-2022
Gov.UK	Guide to cross compliance in England 2022	https://www.gov.uk/guidance/guide-to-cross-compliance-in-england-2022
Gov.UK	Guidance: Create and use a nutrient management plan	https://www.gov.uk/guidance/create-and-use-a-nutrient-management-plan
Gov.UK	Catchment Sensitive Farming: advice to help farmers and land managers reduce pollution	https://www.gov.uk/guidance/catchment-sensitive-farming-reduce-agricultural-water-pollution
Gov.UK	Guidance: Storing silage, slurry and agricultural fuel oil (SSAFO) regulations	https://www.gov.uk/guidance/storing-silage-slurry-and-agricultural-fuel-oil

¹¹ Gov.UK (2021). SW4: 12m to 24m watercourse buffer strip on cultivated land. Accessed at: <https://www.gov.uk/countryside-stewardship-grants/12m-to-24m-watercourse-buffer-strip-on-cultivated-land-sw4>

Gov.UK	Nitrate Vulnerable Zones: Rules farmers and landowners must follow if their land is in a nitrate vulnerable zone (NVZ)	https://www.gov.uk/government/collections/nitrate-vulnerable-zones
Defra	Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for farmers, growers and land managers	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/268691/pb13558-cogap-131223.pdf
Natural England (CSF)	Catchment Sensitive Farming Publications and Case Studies	http://publications.naturalengland.org.uk/category/6919090 http://publications.naturalengland.org.uk/category/45002
Environment Agency, Natural England and Natural Resources Wales	River Wye SAC: Nutrient Management Plan, Phosphate Action Plan	https://www.herefordshire.gov.uk/downloads/file/23069/river-wye-sac-nutrient-management-plan-phosphate-action-plan-november-2021
Catchment Based Approach (CaBa)	Information on Catchment Sensitive Farming	https://catchmentbasedapproach.org/learn/catchment-sensitive-farming/
Championing the Farmed Environment (CFE)	Nutrient management for your farm business	https://www.cfeonline.org.uk/cfe_leaflet_nutrients_web/
Championing the Farmed Environment (CFE)	Prevent contamination of water to protect your farm and other users	https://www.cfeonline.org.uk/environmental-management/water/
Championing the Farmed Environment (CFE)	Enhance your productivity and protect the environment by taking care of your soils	https://www.cfeonline.org.uk/environmental-management/soils/
AHDB	Nutrient Management Guide (RB209)	https://ahdb.org.uk/nutrient-management-guide-rb209
Wye Catchment Partnership	The Wye Catchment Partnership Plan	https://catchmentbasedapproach.org/wp-content/uploads/2020/04/Wye-Catchment-Partnership-Plan_2019.pdf
The Wye and Usk foundation	Nutrient Offsetting	https://www.wyeuskfoundation.org/nutrient-offsetting-service
Westcountry Rivers Trust and South West Water	Upstream thinking projects	https://wrt.org.uk/project/ust2/ https://wrt.org.uk/wp-content/uploads/2020/11/j121-sww-ust-v7-290920.pdf

Table 3: Sources of legislation or guidance linked to each mitigation measure

Method Name	Farm type applicability	Farming Rules for Water (Required) (FRfW)	Farming Rules for Water (Reasonable) (FRfW)	Storing Silage and Agricultural Fuel Oil (SSAFO)	Nitrate Vulnerable Zones (NVZ)	Countryside Stewardship (CS)	Catchment Sensitive Farming (CSF)
4. Establish cover crops in the Autumn	Spring crops		Y			Y	Y
5: Early harvesting and establishment of crops in the autumn	Potatoes and Maize		Y				Y
6: Cultivate land for crops in spring rather than autumn, retaining over-winter stubbles	Spring crops		Y				Y
7: Adopt reduced cultivation systems	Drained arable soils						Y
8: Cultivate compacted tillage soils	Arable		Y				Y
9: Cultivate and drill across the slope	Slopes						Y
10: Leave autumn seedbeds rough	Winter cereals		Y				Y
11: Manage over-winter tramlines	Winter cereals		Y				Y
13: Establish in-field grass buffer strips	Arable					Y	Y
14: Establish riparian buffer strips	Riparian fields (field area next to a river or stream)		Y			Y	Y
15: Loosen compacted soil layers in grassland fields	Grass		Y				Y
16: Allow grassland field drainage systems to deteriorate	Drained grass soils						Y
19: Improved livestock through breeding	All animal farm types						

22: Use a fertiliser recommendation system	All farm types	Y			Y		Y
23: Integrate fertiliser and manure nutrient supply	All farm types	Y			Y	Y	Y
25: Do not apply manufactured fertiliser to high-risk areas	High risk areas within all farm types	Y			Y		Y
26: Avoid spreading manufactured fertiliser to fields at high-risk times	All farm types	Y			Y		Y
27: Use manufactured fertiliser placement technologies	All farm types						Y
32: Do not apply P fertilisers to high P index soils	Fields with a high phosphorus index	Y					Y
35: Reduce the length of the grazing day/grazing season	Grazing farm types					Y	Y
36: Extend the grazing season for cattle	Dairy / Beef						Y
37: Reduce field stocking rates when soils are wet	Grazing farm types		Y			Y	Y
38: Move feeders at regular intervals	Grazing farm types		Y				Y
39: Construct troughs with concrete base	Grazing farm types					Y	Y
52: Increase the capacity of farm slurry stores to improve timing of slurry applications	Dairy / Beef / Pigs						Y
60: Site solid manure heaps away from watercourses/field drains	All animal farm types	Y			Y		Y
61: Store solid manure heaps on an impermeable base and collect effluent	All animal farm types					Y	Y
62: Cover solid manure stores with sheeting	All animal farm types						Y
63: Use liquid/solid manure separation techniques	All animal farm types						Y

64: Use poultry litter additives	Poultry						
68: Do not apply manure to high-risk areas	High risk areas within all animal farm types	Y			Y		Y
69: Do not spread slurry or poultry manure at high-risk times	All animal farm types	Y			Y		Y
71: Use slurry injection application techniques	All animal farm types						Y
72: Do not spread FYM to fields at high-risk times	All animal farm types	Y			Y		Y
73: Incorporate manure into the soil	All animal farm types		Y		Y		Y
76: Fence off rivers and streams from livestock	Livestock farm types with river and stream access within fields		Y			Y	Y
77: Construct bridges for livestock crossing rivers/streams	Livestock farm types with river and stream crossings within fields					Y	Y
78: Re-site gateways away from high-risk areas	High risk areas within all farm types					Y	Y
79: Farm track management	All farm types					Y	Y
80: Establish new hedges	All farm types, suitable for new hedges only						Y
81: Establish and maintain artificial wetlands - steading runoff	Farm types with yards					Y	Y
102: Management of woodland edges	Farm types with woodland						
103: Management of in-field ponds	Farm types with in-field ponds					Y	
105: Management of arable field corners	Arable						
106: Plant areas of farm with wild bird seed / nectar flower mixtures	Arable					Y	

107: Beetle banks	Arable					Y	
108: Uncropped cultivated margins	Arable						
110: Uncropped cultivated areas	Arable					Y	
111: Unfertilised cereal headlands	Cereals						
112: Unharvested cereal headlands	Cereals						
113: Undersown spring cereals	Spring cereals		Y				
114: Management of grassland field corners	Grass					Y	
117: Use correctly inflated low ground pressure tyres on machinery	Arable and grass		Y				Y
118: Locate out-wintered stock away from watercourses	Outwintered livestock		Y				
119: Use dry-cleaning techniques to remove solid waste from yards prior to cleaning	Farm types with yards						
120: Capture of dirty water in a dirty water store	Farm types with yards			Y			Y
122: Avoid irrigating at high risk times	Arable, irrigated crops						
123: Use efficient irrigation techniques (boom trickle, self closing nozzles)	Arable, irrigated crops						
126: Increased use of maize silage	Arable, maize crops						
132: Better health planning: dairy	Dairy						
133: Better health planning: beef	Beef						

134: Better health planning: sheep	Sheep						
135: Improve livestock through genetic modification	Dairy / Beef						
180: Ditch management on arable land	Drained arable soils					Y	Y
181: Ditch management on grassland	Drained grass soils						
331: Reduce dietary N and P intakes: Dairy	Dairy						Y
332: Reduce dietary N and P intakes: Pigs	Pigs						Y
333: Reduce dietary N and P intakes: Poultry	Poultry						Y
341: Adopt phase feeding of livestock: Dairy	Dairy						Y
342: Adopt phase feeding of livestock: Pigs	Pigs						Y
570: Minimise the volume of dirty water produced (sent to dirty water store)	Dairy / Beef				Y	Y	Y
571: Minimise the volume of dirty water produced (sent to slurry store)	Dairy / Beef				Y	Y	

APPENDICES

Appendix 1 Agricultural Development Input Template

Please see separate document.



T: +44 (0) 1235 75 3000

E: enquiry@ricardo.com

W: ee.ricardo.com