APPEAL STATEMENT

BIDDLESTONE ORCHARD, HEREFORDSHIRE

For

FM, JM and MF Green (Ditton Farm)

By

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Ref: P21-178 Biddlestone App \ RPT appeal statement drainage
September 2021

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Revision	Details	Completed by	Date	Checked by	Date
REV01	Draft for comment	JED	24/09/2021	LC	24/09/2021
REV02	Final for issue	JED	24/09/2021	RH	24/09/2021
REV03	Insert	Insert	Insert	Insert	Insert

APPEAL STATEMENT - BIDDLESTONE ORCHARD, HEREFORDSHIRE
EXECUTIVE SUMMARY

Envireau Water was commissioned by the applicant to prepare a flood risk assessment and drainage strategy (FRADS) in March 2012. The FRADS was updated in September 2014 to take account of seasonal workers accommodation, and the inclusion of a water resources assessment. Further revisions were made between October 2016 and June 2017 to take account of changes in the application structure and modifications to the area of polytunnels being applied for.

This Statement has been structured as follows: Section 2 discusses the flood risk and drainage; Section 3 discusses the nutrient status and Section 4 discusses the discharge of nutrients via the ponds. Conclusions are presented in Section 5.

It is concluded that subject to planning conditions being agreed, that sufficient information relating to flood risk and drainage has been submitted to allow planning permission to be granted.

A nutrient assessment undertaken a part of this Statement shows that the proposed development put forward in the applications complies with Herefordshire Local Core Plan Strategy, National Planning Policy and Conservation of Species and Habitats (Amended) (EU Exit) Regulations 2019 as it does not adversely affect water quality and will not compromise the ability to reduce nutrient level in the River Wye SAC, on the contrary reducing the nutrient loading, and in turn nutrient export through the proposed development will contribute to a wider catchment reduction.

The Herefordshire Council ecologist who reviewed the application considered that there may be a risk of nutrient release from the water storage and attenuation ponds, designed to the satisfaction of the council's drainage advisors. None of the sources from which the water collected in the ponds originates will contribute nutrients (Phosphorous or Nitrogen) to the water being captured.

There is a theoretical addition of nutrients to the harvested water if there is runoff across the ground below the polytunnels table-tops. In the highly unlikely event that very small quantities of nutrients are carried forward to the ponds, the nutrient assessment shows that there is a net reduction in nutrient export from the development, when compared to the arable baseline.

It is therefore concluded that all the necessary information has been submitted to demonstrate that the application can be granted, and the appeal upheld.

Envireau Water
24th September 2021

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APPEAL STATEMENT
BIDDLESTONE ORCHARD, HEREFORDSHIRE

1 INTRODUCTION

1.1 Background

Envireau Water was commissioned by the applicant to prepare a flood risk assessment and drainage strategy (FRADS) in March 2012. The FRADS was updated in September 2014 to take account of seasonal workers accommodation, and the inclusion of a water resources assessment. Further revisions were made between October 2016 and June 2017 to take account of changes in the application structure and modifications to the area of polytunnels being applied for. Full details of the applications and application history are not repeated here, for the sake of brevity.

This statement and the evidence herein, is focussed on the reasons for refusal of seven planning applications 173774 // 173775 // 173776 // 173777 // 173778 // 173779 // 173780 ("the applications") and those relevant paragraphs which specifically relate to flood risk, drainage and discharge, within the decision notices.

1.2 Structure

The reasons for refusal with respect to flood risk, drainage and discharge are generic across the decision documents. For this reason, this statement presents evidence in a generic way, for all the decisions, rather than repeating information for each decision.

Table 1 (Page 4) summarises the reasons for refusal that refer to flood risk and drainage. While the number of reasons may appear extensive, in fact across all the decisions there are only 3 substantially different reasons. These are:

"The application has not provided sufficient information and/ or certainty to demonstrate that the development proposed will not have any adverse impact or harm the integrity of the River Wye Special Area of Conservation (SAC) and Sites of Special Scientific Interests (SSSI). The application has not sufficiently demonstrated with any degree of certainty that significant harm to biodiversity resulting from the development will not occur through the proposed water management and drainage system and that any harm can be adequately mitigated against or compensated for. Therefore, the proposal has failed to demonstrate that there will not be any material harm to the biodiversity interests in the surrounding area as a result of the development and is therefore contrary to policy SS1, SS6, LD2 and SD4 of the Herefordshire Local Plan Core Strategy, paragraphs 174- 177 of the National Planning Policy Framework 2019 and provisions of the Conservation of Species and Habitats Regulations 2017 (amended)."

"The application has failed to provided sufficient information and as a consequence, certainty to demonstrate that the development will include measures for sustainable water management, in connection with both surface and foul water which will reduce flood risk; avoid any adverse impact on water quality; protect and enhance groundwater resources and provide opportunities to enhance biodiversity. The application has not provided any information which demonstrate that risks identified to the wider environment through the proposed development, can be appropriately controlled and mitigated. Therefore the application is considered contrary to section 14 of the National Planning Policy Framework 2019, Policy SS6, SS7 SD3 and SD4 of the Herefordshire Local Plan Core Strategy 2015."

"The application has failed to provided sufficient information and as a consequence, certainty to demonstrate that the development will include measures for sustainable water management, in connection with both surface and foul water which will reduce flood risk; avoid any adverse impact on water quality; protect and enhance groundwater resources and provide opportunities to enhance biodiversity. The application has not provided any information which demonstrate that risks identified to the wider environment through the proposed development, can be appropriately controlled and mitigated. Therefore the application is considered contrary to section 14 of the National Planning Policy Framework 2019, Policy SS6, SS7 SD3 and SD4 of the Herefordshire Local Plan Core Strategy 2015."

In discussions between the applicant, their advisors and the planning authority it was agreed that these reasons for refusal relate to the potential of the proposed development to change the nutrient loading of water leaving the farm, with a concomitant impact on the water quality and by association the fauna and flora in the River Wye.

Rebecca Jenman (Herefordshire Council Planning Officer), in an email dated 13 September 2021 at 15:40 stated:

"*The applications were refused, primarily in connection with the required HRA[1]. Joel[2] and our drainage consultants didn't recommend refusal of the applications, but did recommend that should the Council be minded to grant planning permission then further information was needed to be provided in a suitable worded condition. This further information was listed in there last comments dated 28/8/2020 which can be viewed on the Council website. The Ecologist who completed the HRA wasn't satisfied that the submission had demonstrated that the drainage outfall from each of the ponds would not result in nutrient enrichment (e.g phosphates, nitrates etc) of the proposed outfall to the water course in adjacent water body. If the HRA has been past and the LPA were satisfied that the development would not have had any likely significant impact on the River Wye SAC/SSSI then we would have been able to place a pre-commencement condition as suggested by our Drainage Consultants for the information. From my own experience when it comes to drainage, all matters need to have been addressed and clarified in detail for a HRA to be supported. However*

[1] Habitats Regulations Assessment
[2] Joel Hockenhull of consultants Balfour Beatty acting on behalf of Herefordshire Council as drainage engineers

it is important to point out that the HRA was not only concerned with the drainage outfall but the wider Ecology, and therefore even had a detailed surface water drainage strategy, with all necessary drawings and calculations been submitted, the HRA would have still failed on other matters which had not been addressed satisfactorily.

As the drainage ponds had not been approved under applicant 173775, this filtered through to the other applications, as there was uncertainty over a drainage strategy being approved."

On this basis this Statement has been structured as follows:

Section 2 discusses the flood risk and drainage; Section 3 discusses the nutrient status and Section 4 discusses the discharge of nutrients via the ponds. Conclusions are presented in Section 5.

Table 1 Summary of flood risk and drainage reasons for refusal

Reference	Development	Para	Reason for Refusal	Comments
173774	To erect up to 28 hectares of fixed (i.e. non-rotating) 'Spanish' polytunnels over arable (soft fruit) crops.	3	The application has not provided sufficient information and/ or certainty to demonstrate that the development proposed will not have any adverse impact or harm the integrity of the River Wye Special Area of Conservation (SAC) and Sites of Special Scientific Interests (SSSI). The application has not sufficiently demonstrated with any degree of certainty that significant harm to biodiversity resulting from the development will not occur through the proposed water management and drainage system and that any harm can be adequately mitigated against or compensated for. Therefore, the proposal has failed to demonstrate that there will not be any material harm to the biodiversity interests in the surrounding area as a result of the development and is therefore contrary to policy SS1, SS6, LD2 and SD4 of the Herefordshire Local Plan Core Strategy, paragraphs 174- 177 of the National Planning Policy Framework 2019 and provisions of the Conservation of Species and Habitats Regulations 2017 (amended).	Base case 1
		4	The application has failed to provided sufficient information and as a consequence, certainty to demonstrate that the development will include measures for sustainable water management, in connection with both surface and foul water which will reduce flood risk; avoid any adverse impact on water quality; protect and enhance groundwater resources and provide opportunities to enhance biodiversity. The application has not provided any information which demonstrate that risks identified to the wider environment through the proposed development, can be appropriately controlled and mitigated. Therefore the application is considered contrary to section 14 of the National Planning Policy Framework 2019, Policy SS6, SS7 SD3 and SD4 of the Herefordshire Local Plan Core Strategy 2015.	Base case 2
173775	Excavation and ground profiling to form 3 no. surface water balancing ponds	1	The application has not provided sufficient information and/ or certainty to demonstrate that the development proposed will not have any adverse impact or harm the integrity of the River Wye Special Area of Conservation (SAC) and Sites of Special Scientific Interests (SSSI). The application has not sufficiently demonstrated with any degree of certainty that significant harm to biodiversity resulting from the development will not occur through the proposed water management and drainage system and that any harm can be adequately mitigated against or compensated for. Therefore, the proposal has failed to demonstrate that there will not be any material harm to the biodiversity interests in the surrounding area as a result of the development and is therefore contrary to policy SS1, SS6 and LD2 of the Herefordshire Local	Base case 1 without SD4

			Plan Core Strategy, paragraphs 174- 177 of the National Planning Policy Framework 2019 and provisions of the Conservation of Species and Habitats Regulations 2017 (amended).	
		2	The application has not provided sufficient information through the proposed surface water management drainage strategy that demonstrates that the strategy will reduce flood risks (on and off the site) or that risks have been appropriately controlled and mitigated. The submission has not included detailed drawings with supporting calculations how the proposed ponds will be built and maintained and made safe for the lifetime of the development. Insufficient information has been provided on Water retaining structures, flow controls and low flow bypasses. The proposal has not demonstrated it will not increase the risk of surface water flooding hereabouts and has not adequately demonstrated that it is capable of incorporating sustainable drainage systems appropriate to its hydrological setting. Therefore the application is considered contrary to section 14 of the National Planning Policy Framework 2019, Policy SS6, SS7 and SD3 of the Herefordshire Local Plan Core Strategy 2015.	Base case 3
173776	The retention of 6 existing caravans/replacement residential demountable modular 'pods' and the installation of 6 demountable modular welfare (on-residential) buildings (toilets, mess etc.)	1	The application has failed to provide sufficient information and/ or certainty to demonstrate that the development proposed will not have any adverse impact or harm the integrity of the River Wye Special Area of Conservation (SAC) and Sites of Special Scientific Interests (SSSI). In the absence of a detailed foul and surface water management system, the application has provided insufficient information to demonstrate with any degree of certainty that significant harm to biodiversity resulting from the development will not occur through the proposed water management and drainage system and that any harm could be adequately mitigated against or compensated for. Therefore, the proposal has failed to demonstrate that there will not be any material harm to the biodiversity interests in the surrounding area as a result of the development and is therefore contrary to policy SS1, SS6, SD3, SD4 and LD2 of the Herefordshire Local Plan Core Strategy and paragraphs 174- 177 of the National Planning Policy Framework 2019 and provisions of the Conservation of Species and Habitats Regulations 2017 (amended).	Base case 1 with SD3
		3	The application has failed to provided sufficient information and as a consequence, certainty to demonstrate that the development will include measures for sustainable water management, in connection with both surface and foul water, which will reduce flood risk; avoid any adverse impact on water quality; protect and enhance groundwater resources and provide opportunities to enhance biodiversity. The application has not provided any information which demonstrate that risks identified to the wider environment through the proposed development, can be appropriately controlled and mitigated. Therefore the application is considered contrary to section 14 of the National	Base case 2

			Planning Policy Framework 2019, Policy SS6, SS7 SD3 and SD4 of the Herefordshire Local Plan Core Strategy 2015.	
173777	Erection of profiled-steel-clad portal frame pumphouse building and 2 no. water tanks	2	In the absence of sufficient details, the application has failed to demonstrate with certainty that the development will include measures for sustainable water management, in connection with both surface and foul water, which will reduce flood risk; avoid any adverse impact on water quality; protect and enhance groundwater resources and provide opportunities to enhance biodiversity. The application has not provided any information which demonstrate that risks identified to the wider environment through the proposed development, can be appropriately controlled and mitigated. Therefore the application is considered contrary to section 14 of the National Planning Policy Framework 2019, Policy SS6, SS7 SD3 and SD4 of the Herefordshire Local Plan Core Strategy 2015.	Effectively the same as Base case 2
		3	The application has not provided sufficient information and/ or certainty to demonstrate that the development proposed will not have any adverse impact or harm the integrity of the River Wye Special Area of Conservation (SAC) and Sites of Special Scientific Interests (SSSI). The application has not sufficiently demonstrated with any degree of certainty that significant harm to biodiversity resulting from the development will not occur through the proposed water management and drainage system and that any harm can be adequately mitigated against or compensated for. Therefore, the proposal has failed to demonstrate that there will not be any material harm to the biodiversity interests in the surrounding area as a result of the development and is therefore contrary to policy SS1, SS6, LD2 and SD3 of the Herefordshire Local Plan Core Strategy, paragraphs 174- 177 of the National Planning Policy Framework 2019 and provisions of the Conservation of Species and Habitats Regulations 2017 (amended).	Base case 1, with SD3 but without SD4
173778	Erection of profiled-steel-clad portal frame general purpose agricultural building	2	In the absence of sufficient details, the application has failed to demonstrate with certainty that the development will include measures for sustainable water management, in connection with both surface and foul water, which will reduce flood risk; avoid any adverse impact on water quality; protect and enhance groundwater resources and provide opportunities to enhance biodiversity. The application has not provided any information which demonstrate that risks identified to the wider environment through the proposed development, can be appropriately controlled and mitigated. Therefore the application is considered contrary to section 14 of the National Planning Policy Framework 2019, Policy SS6, SS7 SD3 and SD4 of the Herefordshire Local Plan Core Strategy 2015.	Effectively the same as Base case 2
		3	The application has not provided sufficient information and/ or certainty to demonstrate that the development proposed will not have any adverse impact or harm the integrity of the River Wye Special	Base case 1 without SD4

			Area of Conservation (SAC) and Sites of Special Scientific Interests (SSSI). The application has not sufficiently demonstrated with any degree of certainty that significant harm to biodiversity resulting from the development will not occur through the proposed water management and drainage system and that any harm can be adequately mitigated against or compensated for. Therefore, the proposal has failed to demonstrate that there will not be any material harm to the biodiversity interests in the surrounding area as a result of the development and is therefore contrary to policy SS1, SS6, LD2 and SD3 of the Herefordshire Local Plan Core Strategy, paragraphs 174- 177 of the National Planning Policy Framework 2019 and provisions of the Conservation of Species and Habitats Regulations 2017 (amended).	
173780	Upgrading existing vehicular access/egress to/from the A4137 Garrenhill Road and laying out of upgraded access track	2	The application has not been supported with any surface water drainage strategy showing how surface water from the proposed development will be managed. Accordingly, the Local Planning Authority, based on the information submitted with the application, cannot be certain that the development will not increase the risk of surface water flooding hereabouts and has not adequately demonstrated that it is capable of incorporating sustainable drainage systems appropriate to its hydrological setting. Therefore the application is considered contrary to section 14 of the National Planning Policy Framework 2019, Policy SS6, SS7 and SD3 of the Herefordshire Local Plan Core Strategy 2015.	Effectively the same as Base case 2
		3	The application has not provided sufficient information and/ or certainty to demonstrate that the development proposed will not have any adverse impact or harm the integrity of the River Wye Special Area of Conservation (SAC) and Sites of Special Scientific Interests (SSSI). The application has not sufficiently demonstrated with any degree of certainty that significant harm to biodiversity resulting from the development will not occur through the proposed water management and drainage system and that any harm can be adequately mitigated against or compensated for. Therefore, the proposal has failed to demonstrate that there will not be any material harm to the biodiversity interests in the surrounding area as a result of the development and is therefore contrary to contrary to the provisions of the Conservation of Species and Habitats Regulations 2017 (as Amended), policies SS1, SS6 and LD2 of the Herefordshire Local Plan Core Strategy and paragraphs 174- 177 of the National Planning Policy Framework 2019.	Base case 1 without SD4

2 FLOOD RISK AND DRAINAGE

Appendix A presents details of the flood risk and drainage reports, and revisions submitted as part of this planning application process, together with summary details of meetings held with Herefordshire County Council.

Comments made by Herefordshire Council and their advisors were taken on board and additional reports or amendments to submitted reports were prepared when requested. This process resulted in the fact that Herefordshire Council reported on 21/09/2020:

"With regards to drainage, Joel Hockenhull's [Balfour Beatty] comments came through at the beginning of September [2020] and confirmed that at this stage no further information was required prior to planning permission being granted. However, this was subject to planning conditions relating to further details on the surface water drainage strategy."

It is therefore concluded that subject to planning conditions being agreed, that sufficient information relating to flood risk and drainage has been submitted to allow planning permission to be granted.

3 NUTRIENT STATUS

An assessment of the impact on the nutrient status of the River Wye catchment was not requested by Herefordshire Council during any of the discussions with them, listed in Appendix A. The requirement for such an assessment only became apparent after the refusal notices had been issued, and there had been further discussions with the Council.

It is now understood that to comply with Herefordshire's Local Plan Core Strategy, National Planning Policy and Conservation of Species and Habitats (Amended) (EU Exit) Regulations 2019 an assessment of the proposed water management and drainage system in relation to nutrient loading to the wider catchment is required.

In response to the requirement for an assessment Envireau Water undertook a surface water nutrient study of the proposed development using tools developed by Natural England and Herefordshire Council. The full assessment is presented in Appendix B.

The assessment has been undertaken to demonstrate the proposed development's effect on water quality and identify the resulting nutrient levels. Because the issues are generic to all the applications only one assessment and report has been prepared.

The assessment shows that there is a significant reduction in Nitrogen and Phosphorous loading to the soil from the change in land use. The results are shown in Table 2 below.

Table 2 Summary of Change in Nutrient Loading from Proposed Development

Nutrient	Existing Loading	Proposed Loading	Field Loading Reduction
	kg/yr	kg/yr	
Nitrogen	5,180	2,079	60%
Phosphorus	2,102	362	83%

The changes to Nitrogen and Phosphorous export rates from the proposed development are summarised in Table 3. Table 3 shows that export of both Nitrogen and Phosphorous will be reduced as a result of the proposed development.

Table 3 Summary of Nutrient Export Changes from Proposed Development

Nutrient	Existing Export	Proposed Export	Export Reduction	Percentage Difference (%)
	kg/yr	kg/yr	kg/yr	
Nitrogen	526	125	-401	76
Phosphorus	5.6	3.5	-2.46	37

The nutrient assessment shows that the proposed development results in a reduction in nutrient export for both nitrogen and phosphorus. Therefore, in line with the assessment methodology there is no mitigation or compensation required as part of the development.

The proposed development does not pose a risk in terms of suspended solids transport off site by virtue of the growing method, the grass sward under and around the polytunnels and the capture of storm water for storage and irrigation (rainwater harvesting).

The assessment shows that the proposed development put forward in the applications complies with Herefordshire Local Core Plan Strategy, National Planning Policy and Conservation of Species and Habitats (Amended) (EU Exit) Regulations 2019 as it does not adversely affect water quality and will not compromise the ability to reduce nutrient level in the River Wye SAC; on the contrary reducing the nutrient loading, and in turn nutrient export through the proposed development will contribute to a wider catchment reduction.

4 POND DISCHARGES

In her email dated 13 September 2021 at 15:40, Rebecca Jenman (Herefordshire Council Planning Officer) stated:

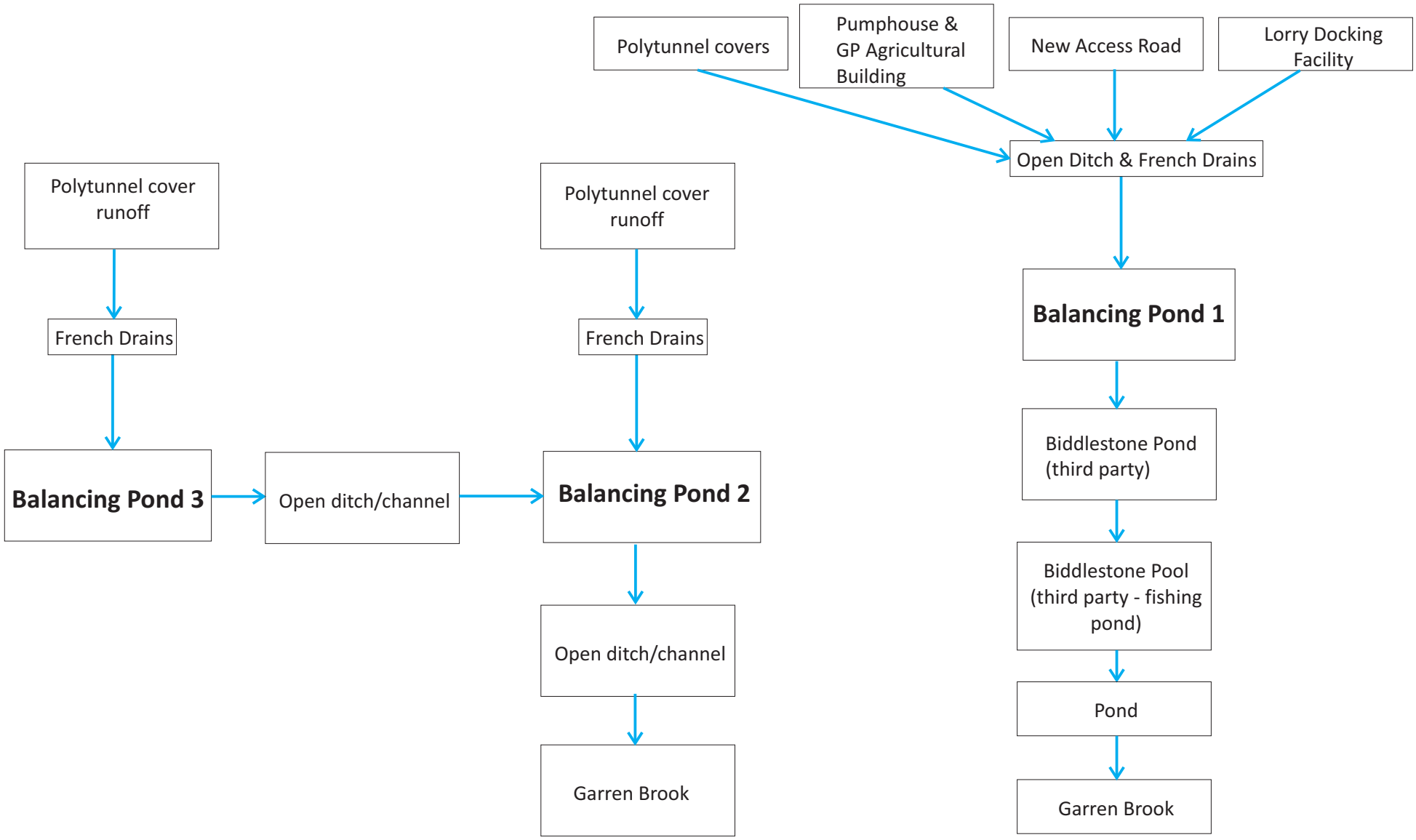
"The Ecologist who completed the HRA wasn't satisfied that the submission had demonstrated that the drainage outfall from each of the ponds would not result in nutrient enrichment (e.g phosphates, nitrates etc) of the proposed outfall to the water course in adjacent water body."

The ponds in question refer to the rainwater harvesting and drainage balancing ponds proposed and specified in the flood risk and drainage work and agreed to by Herefordshire Council's drainage advisors.

Figure 1 shows the sources of water and the pathways that the water takes on its way to the ponds, and the discharge, eventually to the Garren Brook. Along all the pathways, the water being collected is derived from either the polytunnel covers, building roofs or the access road / lorry docking area. None of these sources will contribute nutrients (Phosphorous or Nitrogen) to the water being captured.

There is a theoretical addition of nutrients to the harvested water if there is runoff across the ground below the polytunnels table-tops. In theory, this runoff could pick up residues from the water lost from the table-tops. However, because the tunnels are covered and grass is growing below the table-tops, there is always a moisture deficit in the soil, which means that water lost from the table-tops will infiltrate into the soil taking the nutrients with it. Therefore, the nutrients will not be available to be picked up with any runoff. Thus, no nutrients will be captured in the ponds.

In the highly unlikely event that very small quantities of nutrients are carried forward to the ponds, the assessment in Appendix B shows that there is a net reduction in nutrient export from the development, when compared to the existing arable baseline.



envireau WATER

Ref: P20-178 Biddlestone App \ FIG Line Diagram Date: 23/09/2021	**Biddlestone Farm**
Figure 1	Flow Diagram - Sources, Pathways, Outfalls

5 CONCLUSIONS

Herefordshire Council's own drainage consultants accepted the flood risk and drainage assessments put forward and did not recommend refusal based on flood risk or drainage issues.

The basis of the reasons for refusal relating to flood risk and drainage originated from Herefordshire Council's ecologist, based on the potential for nutrient enrichment in the catchment.

A detailed analysis of nutrient release, using tools developed by Natural England and Herefordshire Council has demonstrated that the proposed development put forward in the applications complies with Herefordshire Local Core Plan Strategy, National Planning Policy and Conservation of Species and Habitats (Amended) (EU Exit) Regulations 2019 as it does not adversely affect water quality and will not compromise the ability to reduce nutrient level in the River Wye SAC, on the contrary reducing the nutrient loading, and in turn nutrient export through the proposed development will contribute to a reduction in nutrients in the wider catchment.

The rainwater harvesting and drainage attenuation ponds are not connected to a source of nutrients. As such, the outfall from the ponds will not result in nutrient enrichment in the receiving water course, the River Wye or the wider catchment.

In the highly unlikely event that very small quantities of nutrients are carried forward to the ponds, the nutrient assessment shows that there is a net reduction in nutrient export from the development, when compared to the existing arable baseline.

It is therefore considered that all the necessary information has been submitted to demonstrate that the application can be granted, and the appeal upheld.

Envireau Water
24/09/2021

APPENDIX A

CHRONOLOGY OF DOCUMENT SUBMISSIONS AND HEREFORDSHIRE COUNCIL RESPONSES RELATING TO FLOOD RISK, DRAINAGE ASSESSMENTS

Chronology of document submissions and Herefordshire Council responses relating to flood risk, drainage and water resource assessments.

Date	Document	For planning application:	Comments
March 2012	Envireau Water: Biddlestone Orchard FRA.	To support two planning applications: 1. To erect fixed, permanent (i.e., non-rotating) 'Spanish polytunnels over arable (soft fruit) crops grown on 'Table-tops'. 2. To erect buildings / structures (including a pump house and store, irrigation water tanks, and a docking station) and to carry out engineering works (laying out of hard standing and access road and creation of new vehicular access to the A4137) ancillary to the proposed polytunnels.	Original FRA (Flood Risk Assessment) submitted for original planning application.
September 2014	Envireau Water: 1) Biddlestone Orchard FRA. 2) Biddlestone Orchard Water Resource Assessment.	To support two planning applications: 1. To erect fixed, permanent (i.e., non-rotating) 'Spanish polytunnels over arable (soft fruit) crops grown on 'Table-tops'. 2. To erect buildings / structures (including a pump house and store, irrigation water tanks, and a docking station) and to carry out engineering works (laying out of hard standing and access road and creation of new vehicular access to the A4137) ancillary to the proposed polytunnels.	Updated FRA to include SAWA (Seasonal Agricultural Workers Accommodation). Application supplemented by a WRA (Water Resource Assessment).
September 2015	Envireau Water: Biddlestone Orchard FRA –Technical Addendum.	To support five interrelated planning applications: Planning Application Reference :(P143663/F, P143664/F, P143665/F, P143666/F and P143667/F). 1. For the erection of up to 35 hectares of fixed Spanish polytunnels over arable crops grown on 'Table-tops'. 2. Erection of portal frame pump house with external water tanks. 3. Erection of general purpose agricultural building 4. Creation of elevated docking / loading platform. 5. Upgrade of vehicular access to the A4137 and laying out of upgraded access road.	Revised planning application. Technical addendum produced for the 2014 FRA.
October 2016	Envireau Water: Biddlestone Orchard FRA – Revised Technical Addendum.		2015 technical addendum updated.
June 2017	Envireau Water: 1) Biddlestone Orchard FRA and Surface Water Management Strategy. 2) Biddlestone Orchard Water	In support of seven planning applications for developments on approximately 53ha of land at Biddlestone Orchards, Llangarron, Ross-on-Wye in Herefordshire. 1. Planning Application Ref. 173774: To erect up to 32 hectares of fixed (i.e., non-rotating) Spanish polytunnels over arable (soft fruit) crops. 2. Planning Application Ref. 173775: Excavations ground profiling to form three surface water balancing ponds (for stormwater storage and irrigation waters). 3. Planning Application Ref. 173776: Change of use of land from agriculture to a site for the accommodation of seasonal agricultural workers in demountable portable modular buildings, together with	New Planning applications. New FRA produced to encompass all seven planning applications. New WRA produced to support planning application. No planning application reference is given. The report simply states: "*A planning application for the erection of up to 32 hectares of permanent polytunnels at Biddlestone Farm, Llangarron, Herefordshire is being submitted on behalf of FM Green (Ditton farm)*". Comments are provided in the report regarding rainwater harvesting and

Chronology of document submissions and Herefordshire Council responses relating to flood risk, drainage and water resource assessments.

Date	Document	For planning application:	Comments
	Resource Assessment.	ancillary toilet/shower, kitchen, staff shop and IT/recreation units, stationed permanently on the site. 4. Planning Application Ref. 173777: Erection of a profiled-steel-clad portal frame pumphouse building and two water storage tanks. 5. Planning Application Ref. 173778: Erection of a profiled-steel-clad portal frame general purpose agricultural building. 6. Planning Application Ref. 173779: Creation (engineering operation) of a covered elevated lorry docking/loading platform. 7. Planning Application Ref. 173780: Upgrading vehicular access to the A4137 and laying out of upgraded access road.	storage in balancing ponds. There is also a short section on potential impact on the R. Wye SAC.
31/01/2018	WSP/Balfour Beatty: Tabulated Document Response to FRA and water management strategy.	For planning application Ref. 173774 (Polytunnels); 173775 (Balancing Ponds) & 173776 (SAWA). Document provided via email from Herefordshire CC on 26/03/2018.	The document introduction states that "*The Applicant has submitted multiple planning applications for the development of this site. As flood risk and drainage aspects must consider the site as a whole, a combined response has been provided for the applications listed below*:" The applications listed are for three of the seven applications [Ref. 173774 (Polytunnels); 173775 (Balancing Ponds) & 173776 (SAWA)]. However, the document does include comments relating to "Lorry Docking Facility" and also Pollution Control and the Foul Water Management Strategy. The document provides a development description given as "*The Applicant proposes the construction of permanent 'Spanish' poly-tunnels occupying an area of 31.6 ha; three attenuation ponds with a combined capacity of 25,000m^3; accommodation for up to 210 workers occupying an area of 1.85 ha; other agricultural buildings occupying an area of 0.48 ha; and access, parking and lorry docking/loading stations occupying an area of 0.17 ha*."
19/04/2018	Email from Ray Williams: RW Agricultural Consultancy Ltd		Ray Williams (RW Agricultural Consultancy Ltd), Mark Green (Ditton Farm) and Paul Dunham (Paul Dunham Associates) met with Roland Close (HCC) and Joel Hockenhull (Balfour Beatty) on site to discuss applications. Commentary provided in email that the SAWA will be proposed to be removed from the application except for six caravans.
21/12/2018	Envireau Water: Supplementary Note. Containing cover note and reports: 1) Biddlestone Orchard Further Information Note REV03.	Direct response from EW to WSP/Balfour Beatty with respect to WSP/Balfour Beatty document dated 31/01/2018. (Shown as uploaded to (or dated on) the HCC planning portal on 15/5/2019).	Revision 3 and time delay resultant from changes in decisions on scheme revisions; polytunnel "Area 12", SAWA and consultations with HCC by Ditton Farm, RW Agricultural Consultancy Ltd and Paul Dunham Associates. The covering note makes reference to planning applications 173774 (Polytunnels); 173775 (Balancing Ponds) & 173776 (SAWA) in line with the

Chronology of document submissions and Herefordshire Council responses relating to flood risk, drainage and water resource assessments.

Date	Document	For planning application:	Comments
	2) Biddlestone Orchard Tier 1 Pond Breach Assessment REV03.		WSP/Balfour Beatty document and discusses the omission of the SAWA and "Area 12" from the planning applications. The EW further information document is titled as a response to planning applications: 173774 (Polytunnels); 173775 (Balancing Ponds) & 173776 (SAWA). However, the document does state that storage calculations provided have included all polytunnels and other proposed hardstanding areas at the site. The document also answers queries on the lorry docking facility, pollution control from vehicular access areas and foul water management. The EW breach assessment document is titled as a response to planning applications: Ref. 173774 (Polytunnels); 173775 (Balancing Ponds) & 173776 (SAWA) in line with the WSP/Balfour Beatty document.
04/07/2019	WSP/Balfour Beatty: Updated Tabulated Document Response.	For planning application Ref. 173774 (Polytunnels); 173775 (Balancing Ponds) 173776 (SAWA). Same document as 31/01/2018 updated to incorporate additional comments. Many of the tabulated comments "approved" but some still outstanding comments.	The document introduction **STILL** states that "*The Applicant has submitted multiple planning applications for the development of this site. As flood risk and drainage aspects must consider the site as a whole, a combined response has been provided for the applications listed below*:" Again, the applications listed are for three of the seven applications [Ref. 173774 (Polytunnels); 173775 (Balancing Ponds) & 173776 (SAWA)]. The document provides a development description that has **CHANGED TO**: "*The Applicant proposes the construction of permanent 'Spanish' poly-tunnels occupying an area of 31.6 ha; three attenuation ponds with a combined capacity of 25,000m^3; other agricultural buildings occupying an area of 0.48 ha; and access, parking and lorry docking/loading stations occupying an area of 0.17 ha. An application for accommodation for up to 210 workers has been withdrawn as part of the most recent planning submission*." Comments on "Lorry Docking Facility"; Pollution Control and Foul Water Management Strategy are all "**approved**" subject to planning conditions.
27/02/2020	Site Visit with EW, RW Agricultural Consultancy Ltd, Ditton Farm, WSP and Balfour Beatty.	To discuss outstanding comments in relation to WSP/Balfour Beatty document dated 04/07/2019. Site visit followed up with email feedback to RW Agricultural Consultancy Ltd and Aspbury Planning stating what was agreed in principle and further works required for breach assessment and clarification of discharge arrangements and discharge rates.	Attending: Lee Clarke (EW); Michael Underwood (EW); Ray Williams (RW Agricultural Consultancy Ltd); Frank Green (Ditton Farm); Joel Hockenhull (Balfour Beatty); Simon Olivier (WSP) & Joanna Goodwin (WSP). Agreement in principle reached on technical approach, drainage proposals, outfalls and breach modelling methodology and further requirements.

Chronology of document submissions and Herefordshire Council responses relating to flood risk, drainage and water resource assessments.

Date	Document	For planning application:	Comments
14/04/2020	Envireau Water: Biddlestone Orchard Technical Note FRA Addendum.	Direct response from EW to WSP/Balfour Beatty with respect to WSP/Balfour Beatty document dated 04/07/2019.	The FRA technical note addendum makes reference to planning applications 173774 (Polytunnels); 173775 (Balancing Ponds) & 173776 (SAWA) in line with the WSP/Balfour Beatty document and discusses greenfield runoff rates and balancing ponds. The breach technical note addendum makes no reference to planning applications but is solely focused on breach of the balancing ponds and impact on the Garren Brook at pinch points, in response to WSP/Balfour Beatty comments.
23/04/2020	Envireau Water: Biddlestone Orchard Technical Note Breach Addendum.		
20/05/2020	WSP/Balfour Beatty: Updated Tabulated Document Response.	For planning application Ref. 173774 (Polytunnels); 173775 (Balancing Ponds) 173776 (SAWA). Same document as 04/07/2019. Most of the tabulated comments "approved" but some still outstanding comments.	The document introduction **STILL** states that "*The Applicant has submitted multiple planning applications for the development of this site. As flood risk and drainage aspects must consider the site as a whole, a combined response has been provided for the applications listed below*:" Again, the applications listed are for three of the seven applications [Ref. 173774 (Polytunnels); 173775 (Balancing Ponds) & 173776 (SAWA)]. The document provides a development description that is the same as the document provided on the 04/07/2019. Outstanding issues: 1. Adjacent landowner agreement for discharge outfalls. 2. Clarification on supporting calculations for calculated Greenfield runoff rates. 3. Request for hydraulic modelling of the drainage system. 4. WSP/BB recommend that HCC discuss and agree breach flood depths and velocities with Highways Authority and Herefordshire Emergency Planners. 5. Clarification of drainage "flood" exceedance routes and supporting calculations.
23/06/2020	MS Teams Meeting	Teams meeting to discuss outstanding issues raised by WSP/Balfour Beatty in their document dated 20/05/2020.	Attending: James Dodds (EW); Lee Clarke (EW); Rebecca Haw (EW); Tony Aspbury (Aspbury Planning); Ray Williams (RW Agricultural Consultancy Ltd); Joel Hockenhull (Balfour Beatty); Simon Olivier (WSP); Kelly Gibbons (HCC).
01/07/2020	Envireau Water: Biddlestone Orchard Technical Note – FRA Meeting.	To respond to Balfour Beatty/WSP comments provided on 20/05/2020 and following Teams call with WSP/Balfour Beatty/ Herefordshire Council/Aspbury Planning/Envireau Water/Ditton Farms & Ray Williams.	Document makes no reference to planning application references and states that the technical note: "*summarises our responses to questions raised by Simon Olivier (WSP) in his Flood Risk and Drainage Checklist response dated 20th May 2020 (Appendix A), and as discussed and agreed in principle subject to internal checks in WSP, in a webmeeting on Tuesday 23rd June 2020*."

Chronology of document submissions and Herefordshire Council responses relating to flood risk, drainage and water resource assessments.

Date	Document	For planning application:	Comments
21/09/2020	Email response from Rebecca Jenman (Principal Planning Officer Minerals and Waste Development Management, Economy, Environment & Culture) at Hertfordshire Council.		The email makes no reference to planning application references. The email states: "*With regards to drainage, Joel Hockenhull's* [Balfour Beatty] *comments came through at the beginning of September* [2020] *and confirmed that at this stage no further information was required prior to planning permission being granted. However, this was subject to planning conditions relating to further details on the surface water drainage strategy.* *He* [Joel Hockenhull] *did advice that prior to planning permission being granted, we should discuss the risks associated with a breach of the proposed ponds with the Highways Authority and Herefordshire Emergency Planners. Consultations have been sent and will update you on these when we receive them.*" This email is the last communication that EW have received. We've neither seen the comments from Joel Hockenhull referred to above or the consultation response from the Highways Authority and Herefordshire Emergency Planners.

APPENDIX B

SURFACE WATER NUTRIENT ASSESSMENT
BIDDLESTONE FARM, LLANGARRON

SURFACE WATER NUTRIENT ASSESSMENT

BIDDLESTONE FARM, LLANGARRON

For

Mark Green
Ditton Farm
St. Owens Cross
Hereford
United Kingdom
HR2 8LL

By

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Ref: P21-178 Biddlestone App \ RPT Nutrient Neutrality.docx
September 2021

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Revision	Details	Completed by	Date	Checked by	Date
REV01	Draft for comment	RH	13/09/2021	JED	22/09/2021
REV02	Final	JED	23/9/2021	LC	23/9/2021

SURFACE WATER NUTRIENT ASSESSMENT
BIDDLESTONE FARM, LLANGARRON
Non-Technical Summary

Envireau Water has been commissioned to undertake a surface water nutrient assessment of the proposed development at Biddlestone Farm, Llangarron ("the Farm"). The assessment has been requested in response to refusal of seven planning applications 173774 // 173775 // 173776 // 173777 // 173778 // 173779 // 173780 ("the applications") at the Farm.

To comply with Herefordshire's Local Plan Core Strategy, National Planning Policy and Conservation of Species and Habitats (Amended) (EU Exit) Regulations 2019 an assessment of the proposed water management and drainage system in relation to nutrient loading to the wider catchment is required. This had not been identified by the planning authority when the technical work for the planning applications was compiled, and only became a requirement during the planning application determination.

An assessment has been undertaken to demonstrate the proposed development's effect on water quality and identify the resulting nutrient levels. Because the issues are generic to all the applications only one assessment and report has been prepared.

The assessment shows that there is a significant reduction in N and P loading to the soil from the change in land use. The results are shown in Table 1 below.

Table 1 Summary of Change in Nutrient Loading from Proposed Development

Nutrient	Existing Loading	Proposed Loading	Field Loading Reduction
	kg/yr	kg/yr	
Nitrogen	5,180	2,079	60%
Phosphorus	2,102	362	83%

The change to N and P export rates from the Farm is summarised in Table 2. Table 2 shows that export of both N and P will be reduced as a result of the proposed development.

Table 2 Summary of Nutrient Export Changes from Proposed Development at Biddlestone Farm

Nutrient	Existing Export	Proposed Export	Export Reduction	Percentage Difference (%)
	kg/yr	kg/yr	kg/yr	
Nitrogen	526	125	-401	76
Phosphorus	5.6	3.5	-2.46	37

The assessment shows the proposed development results in a reduction is nutrient export for both nitrogen and phosphorus. Therefore, there is no mitigation or compensation required as part of the development.

The proposed development does not pose a risk in terms of suspended solids transport off site by virtue of the growing method, the grass sward under and around the polytunnels and the capture of storm water for storage and irrigation (rainwater harvesting).

The assessment shows that the proposed development put forward in the applications complies with Herefordshire Local Core Plan Strategy, National Planning Policy and Conservation of Species and Habitats (Amended) (EU Exit) Regulations 2019 as it does not adversely affect water quality and will not compromise the ability to reduce nutrient level in the River Wye SAC, on the contrary reducing the nutrient loading, and in turn nutrient export through the proposed development will contribute to a wider catchment reduction.

Envireau Water
23/09/2021

SURFACE WATER NUTRIENT ASSESSMENT

BIDDLESTONE FARM, LLANGARRON

1 INTRODUCTION

Envireau Water has been commissioned by Mr M F Green (Ditton Farm) to undertake a surface water nutrient neutrality assessment of the proposed development at Biddlestone Farm, Llangarron ("the Farm"). The assessment has been requested in response to refusal of seven planning applications 173774 // 173775 // 173776 // 173777 // 173778 // 173779 // 173780 ("the applications") at the Farm.

The applications relate to the erection of up to 28ha of fixed (non-rotating) "table top" based soft fruit polytunnels. Together with the excavation and ground profiling to form 3 no. surface water balancing ponds; the retention of 6 existing caravans and the installation of 6 demountable modular welfare (non-residential) welfare units, erection of a pump house and 2 no. water tanks, creation of lorry docking/ loading platform and upgrading the existing vehicular access from A4137, Garrenhill Road ("the proposed development").

Reasons given for the refusal of planning permission included there being insufficieefnt information and/or certainty to demonstrate that the proposed development will not have any adverse impact or harm to the River Wye Special Area of Conservation (SAC) and Sites of Special Scientific Interest (SSSI); and that the applications had not sufficiently demonstrated with any degree of certainty that significant harm to biodiversity resulting from the development will not occur through the proposed water management and drainage system and any harm mitigated against or compensated for.

In discussions between the applicant, their advisors and the planning authority it was agreed that these reasons for refusal relate to the potential of the proposed development to change the nutrient loading of water leaving the farm, with a concomitant impact on the water quality and by association the fauna and flora in the River Wye.

To comply with Herefordshire's Local Plan Core Strategy, National Planning Policy and Conservation of Species and Habitats (Amended) (EU Exit) Regulations 2019 an assessment of the proposed water management and drainage system in relation to nutrient loading to the wider catchment is required. This had not been identified by the planning authority when the technical work for the planning applications was compiled, and only became a requirement during the planning application determination.

An assessment has been undertaken to demonstrate the proposed development's effect on water quality and identify the resulting nutrient levels. Where necessary mitigation has been identified to ensure there are no adverse effects on wastewater or surface water runoff leaving the Farm. Because the issues are generic to all the applications only one assessment and report has been prepared.

2 METHOD

Natural England (NE) have produced a nutrient neutrality assessment methodology [Ref. 1]. This methodology is the basis of the approach to and methods used in this assessment.

Two key nutrients, phosphorous (P) and nitrogen (N), have been assessed. These nutrients were selected as key nutrients of concern with the River Wye SAC's sensitivity to P and N being key constituents of eutrophication of surface waters.

Using Ref. 1 as a guide, two published nutrient budget calculator tools were applied; the NE methodology for N budget calculations [Ref. 1]; and a tool developed by Herefordshire Council which calculates the P budget [Ref. 2].

The NE methodology was created for the Solent and Stour (Kent) catchments and its original aim was to assess impacts from urban N. The N export from urban land uses in the tool were considered unsuitable for use within this assessment and have been corrected, following the methodology applied within the Herefordshire Council Interim Phosphate Delivery Plan – Stage 1 phosphate budget calculation guidance [Ref. 3].

The first stage of the assessment is to identify the N and P loading rates for each land use at the Farm. Nutrient loading rates were calculated based on actual N and P loading for the existing arable land and polytunnels.

Nutrient loading rates were converted to nutrient export rates using Farmscoper V4 [Ref. 4] following the NE methodology for agricultural land uses. Urban and greenspace land use nutrient exports were also updated following the NE methodology and the N and P export rates from the soils were applied within the budget calculator tools for each nutrient. The inputs to the budget calculators are discussed in detail in Section 3. Using the updated nutrient export rates, the P and N budget calculator tools were run to identify the change in nutrients exported from the Farm currently, and from the proposed development.

Existing areas of the Biddlestone Farm which were omitted from the planning applications in May 2019 have been excluded from the assessment, this includes Area 12 and the existing 6 caravans/replacement residential demountable 'pods'.

Suspended solids export off site is discussed in Section 5, and is based on a review of the site water management plan described in Ref. 5

3 INPUT DATA

To ensure the phosphate and nitrogen budget tools were suitable for the site specific assessment two additional land use types were added: 'Biddlestone arable' and 'polytunnels'. The P and N loading from these land uses were calculated using Farmscoper V4, following the methodology for calculating nitrogen-nitrate and phosphorus loss from agricultural land described in [Ref. 1].

Biddlestone arable nutrient losses were calculated based on actual nutrient application for the last year of cropping with application rates provided by the Farm's agronomist. The application rates and cropping areas

for the last year of cropping are provided in Appendix A. The application rates were modelled within the Farmscoper V4 to identify the N and P export from the current land use.

The application of nutrients from a polytunnel growing set up is based on water lost from the table top growing troughs. Fertigation water (the irrigation water containing fertiliser) passes through the growing troughs. Because it is important to provide a small excess of water to the troughs to prevent a build-up of salts in the growing medium, a small proportion of the water is allowed to drip onto the ground. The remainder of the fertigation water remains within the growing troughs and is taken up by the growing plants. The worst case total water lost to ground from the troughs has been calculated as 9,800 m^3/year (Appendix B). Nutrient content within the lost fertigation water has been provided by existing polytunnel soft fruit growers. This quantity is some 4 times larger than the estimate made in 2017 and included in the water resources assessment, which estimated a 5% loss to ground, equating to 2450m^3/annum. In order to be conservative, the higher estimate based on measured data from a similar farm has been used in this assessment.

The P and N loading rates were calculated by multiplying the annual volume of water lost to the ground from the growing troughs by the maximum concentrations in the data provided (Appendix B). This ensures a conservative approach to the nutrient neutrality assessment. The loading rates were then applied within the Farmscoper V4 model to identify the N and P export for polytunnels. Outputs from the Farmscoper model for current arable land use and polytunnels are provided in Appendix C.

N export from urban land use within the River Wye catchment was calculated as 10.6 kg/ha/yr. The calculations are provided in Appendix D.

Urban greenspace N leaching remained unchanged the majority of nutrient leaching from greenspaces is a result of atmospheric deposition, pet and lawn fertiliser [Ref. 1]. As the greenspace within the development will not receive N from pet waste or lawn fertiliser an export rate of 5 mg/ha/year was considered conservative. This is the same value that the NE methodology applies to both the Stour [Ref. 1] and Solent catchments [Ref. 6].

Additional waste water will be generated as part of the development through the installation of 6 demountable modular (non-residential) welfare units. The total waste water generated from the welfare facilities based on a maximum of 196 workers per day [Ref. 7] and a water use per person of 10 L/day [Ref. 8] is 1.96 m^3/day.

The NE methodology and the Herefordshire phosphate budget calculation tool guidance both provide a deminimis level on wastewater discharge. In both cases discharge does not need assessing if there is no wastewater generated overnight [Ref. 1] and the total discharge from the welfare facilities is less than 2 m^3/day [Ref. 3]. The discharge from the proposed development meets these criteria. In addition, the wastewater generated from the welfare facilities will meet the following additional criteria:

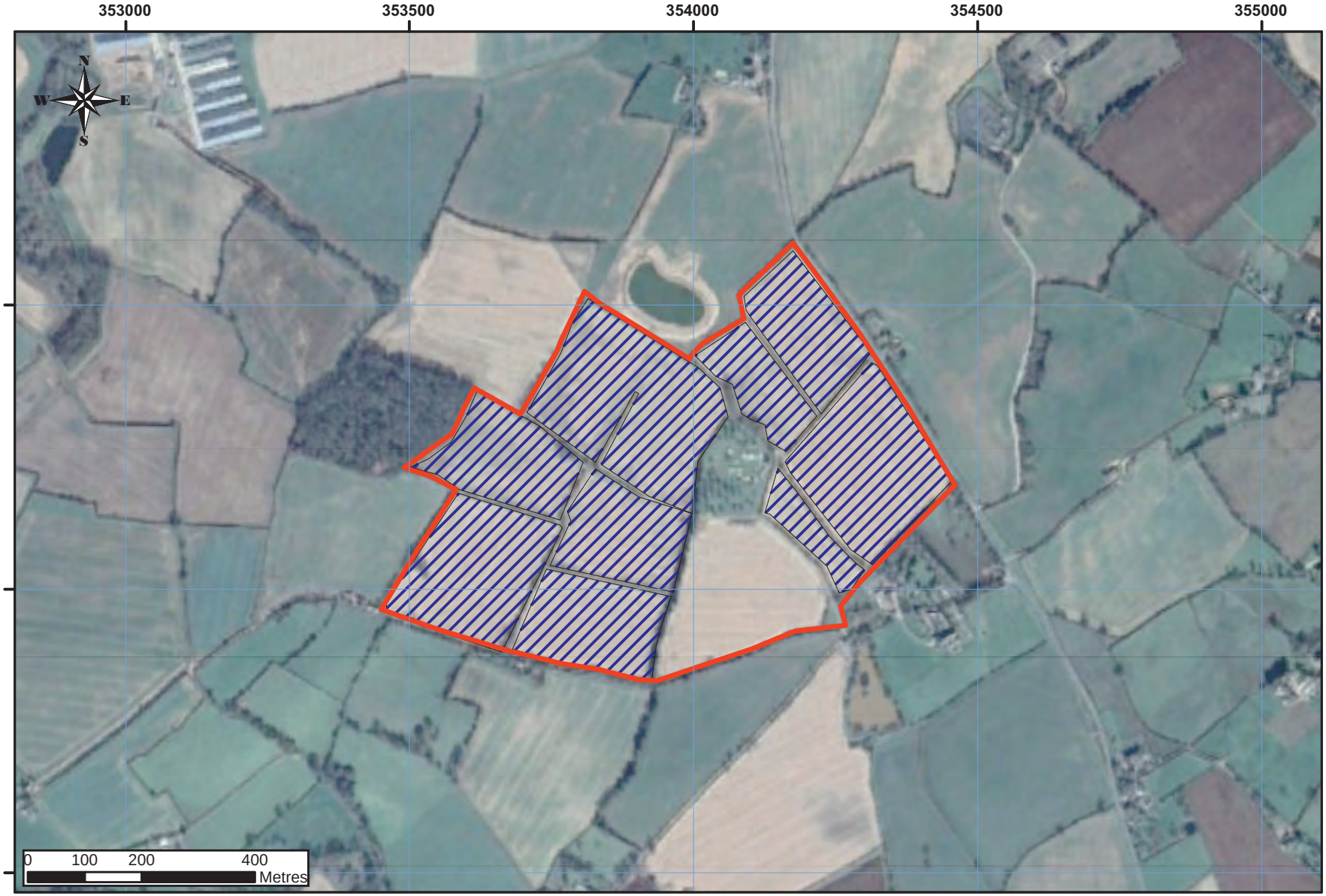
- The package treatment plant drainage field is more than 50 m from any designated site boundary;
- The drainage field is more than 40 m from any surface water feature e.g. ditch, watercourse;
- The drainage field in an area with a slope no greater than 15%;

- The drainage field is in an area where the high water table groundwater depth is at least 2 m below the surface at all time;
- The drainage field will not be subject to significant flooding, e.g. it is not in flood zone 2 or 3;
- There are no other known factors which would expedite the transport of phosphorus for example fissured geology, insufficient soil below the drainage pipes, known sewer flooding, conditions in the soil/geology that would cause remobilisation of phosphorus, presence of mineshafts, etc;
- To ensure that there is no significant in combination effect, the discharge to ground should be at least 200 m from any other discharge to ground.

Compliance with the above criteria will be ensured by careful location of a shallow soil drainage field for the effluent. The drainage field will be designed in accordance with The Building Regulations 2010 Drainage and Waste Disposal Approved Document H 2015 edition [Ref. 9].

On this basis, the wastewater drainage has been excluded from the nutrient neutrality assessment.

Land use areas required by the tools were identified from GoogleEarth® imagery dated 2020 as shown on Figure 1. The proposed land use area was identified from the amended site plan [Ref. 10] and is shown on Figure 2. Greenspace area was defined as the remaining site area not included within other land uses.



Background Image © 20221 CNES / Airbus from Google Earth

Scale 1 : 10,000 at A4

envireau WATER

Ref: P21-178 Biddlestone App \ FIG 1 Current Land Use Date: 10/09/2021	**F M Green - Biddlestone Farm**
Figure 1	Current Land Use

Background Image © 20221 CNES / Airbus from Google Earth

Scale 1 : 10,000 at A4

envireau WATER

Ref: P21-178 Biddlestone App \ FIG 1 Proposed Land Use Date:10/09/2021	**F M Green - Biddlestone Farm**
Figure 2	Proposed Land Use

4 RESULTS

The primary land use change from the proposed development is from arable to polytunnel. A comparison of the nutrient loading for the two land use types based on data for the proposed 28 ha is shown in Table 1. There is a significant reduction in N and P loading to the soil from the change in land use, with both nutrients seeing a reduction of over 50%.

Table 3 Summary of Change in Nutrient Loading from Proposed Development

Nutrient	Existing Loading	Proposed Loading	Field Loading Reduction
	kg/yr	kg/yr	
Nitrogen	5,180	2,079	60%
Phosphorus	2,102	362	83%

The change to N and P export rates from the Farm is summarised in Table 2. The full N budget calculations are provided in Appendix E and the P budget calculations are provided in Appendix F.

Table 4 Summary of Nutrient Export Changes from Proposed Development at Biddlestone Farm

Nutrient	Existing Export	Proposed Export	Export Reduction	Percentage Difference (%)
	kg/yr	kg/yr	kg/yr	
Nitrogen	526	125	-401	76
Phosphorus	5.6	3.5	-2.46	37

Table 2 shows that export of both N and P will be reduced as a result of the proposed development. The proposed development is shown to have a substantial reduction in nitrogen and a smaller but still significant reduction in phosphorus.

Thus, the proposed development does not pose a risk in terms of nutrient status and therefore will not impact on the River Wye SAC and associated protected sites, in this regard.

5 SUSPENDED SOLIDS

Runoff from agricultural land which carries suspended solids (soil) can damage water courses by depositing material on the stream bed, smothering fauna and flora and spawning sites. Nutrients adhering to the soil are also mobilised, increasing the river load.

The proposed development is based on the “table top” growing method, which means that within and around the tunnels the ground surface is covered in grass. In addition, rainwater runoff from the tunnel skins is being collected and stored for rainwater harvesting. As a result of both of these factors, there is no potential for suspended solids runoff from the development. The grass sward prevents erosion of the soil, and the capture of the storm water prevents the concentration of flows which can lead to erosion.

Thus, the proposed development does not pose a risk in terms of suspended solids runoff and therefore will not impact on the River Wye SAC and associated protected sites, in this regard.

6 CONCLUSIONS

This assessment shows the proposed development results in a reduction in nutrient export for both nitrogen and phosphorus. Therefore, there is no mitigation or compensation required as part of the development.

The proposed development does not pose a risk in terms of suspended solids transport off site by virtue of the growing method, the grass sward under and around the polytunnels and the capture of storm water for storage and irrigation (rainwater harvesting).

The assessment shows that the proposed development put forward in the applications complies with Herefordshire Local Core Plan Strategy, National Planning Policy and Conservation of Species and Habitats (Amended) (EU Exit) Regulations 2019 as it does not adversely affect water quality and will not compromise the ability to reduce nutrient level in the River Wye SAC, on the contrary reducing the nutrient loading, and in turn nutrient export through the proposed development will contribute to a wider catchment reduction.

Envireau Water
23/09/21

REFERENCES

Ref. 1 Natural England (2020). Advice on nutrient neutrality for new development in the stour catchment in relation to stodmarsh designated sites – flow local planning authorities, final version V3 November 2020.

Ref. 2 RICARDO (2021). Herefordshire Council Phosphate Budget Calculator Tool.

Ref. 3 RICARDO (2021). Herefordshire Council Interim Phosphate Delivery Plan – Stage 1 – guidance on calculating phosphate budgets for new developments draining to the River Wye SAC. ED14585.

Ref. 4 ADAS (2017). Farmscoper version 4. Environment Agency Project ENV6000718R

Ref. 5 Envireau Water (2020). Biddlestone Orchard Technical Note FRA Addendum dated 14/04/2020. Document ref: P19-339 Biddlestone 2020 \ TN Tech Addendum.

Ref. 6 Natural England (2019). Advice on achieving nutrient neutrality for new development in the Solent region for local planning authorities, version 2 June 2019.

Ref. 7 Jubb Consulting Engineers Limited (2018). Transport Addendum 01 – Biddlestone.

Ref. 8 British Water (2013) Code of Practice Flows and Loads – 4.

Ref. 9 HM Government (2015). The Building Regulations 2010: Drainage and Waste Disposal Approved Document H 2015 Edition.

Ref. 10 Paul Dunham Associated (2019). Drawing 137.445.05.C10M revision 'P' July 2019

APPENDIX A
CURRENT ARABLE LAND USE N AND P LOADING CALCULATIONS

Existing Nutrient Application on Arable Fields at Biddlestone Farm

Crop	ha	kg/ha N	Annual total kg/yr N	kg/ha P	Annual total kg/yr P
Potatoes	6	200	1,200	170	1,020
Winter Oil Seed Rape	4	220	880	0	0
Winter Wheat	8	200	1,600	66.5	532
Maize	10	150	1,500	55	550
Total	*28*		*5,180*		*2,102*

APPENDIX B
POLYTUNNEL N AND P LOADING CALCULATIONS

TYPICAL Nutrient Application from Polytunnels

Typical composition of polytunnel fertigation water provided by an established polytunnel grower in Herefordshire.

Table 1 – Typical Polytunnel Fertigation Water Composition

Polytunnel Fertigation Sample Number	Nitrogen		Phosphorus	
	mmol/L	mg/l	mmol/L	mg/l
M-1-D	10.2	142.8	0.6	18.4
m-2-d	11.8	165.9	0.7	21.5
m-3-d	12.7	178.4	1.0	30.2
m-4-d	13.9	194.8	1.1	34.0
m-5-d	15.1	212.1	1.2	36.9
m-6-d	13.1	183.7	1.1	33.3
m-7-d	10.3	144.3	0.8	25.3
Minimum		*142.8*		*18.4*
Average		*174.6*		*28.5*
Maximum		*212.1*		*36.9*

Typical water loss per hectare from polytunnels. Water usage and loss information provided by an established polytunnel grower in Herefordshire. The polytunnel area has been taken from the proposed polytunnel area at Biddlestone Farm.

Table 2 – Calculation of Annual Water Loss From the Proposed Polytunnels at Biddlestone Farm

Water Use per Hectare (m^3/ha/yr)	Polytunnel Area (ha)	Water Use per Site (m^3/yr)	Water Loss To Ground (%)	Annual Water Loss (m^3/yr)
3,500	28	98,000	10%	9,800

The annual water lost from the proposed polytunnels was multiplied by the maximum nutrient concentration obtained from Table 1 to identify the nutrient loading to the grass below the table tops. The maximum nutrient concentration was taken as a conservative approach representing the worst case scenario.

Table 3 – Summary of Nutrient Loading from Polytunnels

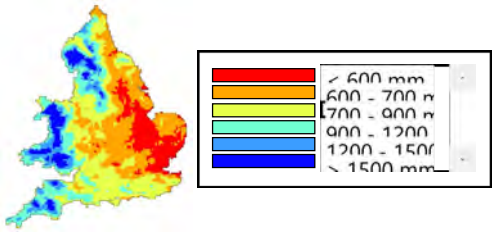
Nutrient	Loading from Total Site	Loading Per hectare
	kg/yr	kg/ha/yr
N	2,079	74
P	362	13

The polytunnel load rates per hectare were applied within Farmscoper. The P loading was converted to P_2O_5 as required by Farmscoper resulting loading rates of 30 kg/ha/yr P_2O_5 for polytunnels.

APPENDIX C
FARMSCOPER ARABLE AND POLYTUNNEL OUTPUT

BIDDLESTONE ARABLE FARMSCOPER RESULTS

1 Select Climate



FARMSCOPER Create

ADAS

2 Select Soil

Soil Type
- (•) Free Draining
- ( ) Other

Drain Status
- [ ] Drained for Arable Use
- [ ] Drained for Grassland Use

3 Select Farm Type

- Blank Farm
- Dairy
- Lowland Grazing
- Upland Grazing
- Mixed Livestock
- Outdoor Pig
- Indoor Pig
- Specialist Poultry
- Roots & Combinable
- Roots & Combinable with Poultry Manure
- Mixed Combinable
- Mixed Combinable with Pig Manure
- Winter Combinable
- Winter Combinable with Pig Manure
- Horticulture
- Poultry plus Roots & Combinable
- Indoor Pigs plus Mixed Combinable
- Indoor Pigs plus Winter Combinable

4 Economics

	Current Cost data loaded
File Name:	FARMSCOPER4_Cost.xls
File Date:	28/07/2017 14:27
Year Selected:	2013

5 View Results

Options

Farm Built

Display Options

- ☐ Dairy
- ☐ Beef
- ☐ Sheep
- ☐ Indoor Pigs
- ☐ Outdoor Pigs
- ☐ Poultry
- ☐ Imported Manure
- ☑ Cropping

☐ Show more detail for Livestock

☑ Show more detail for Cropping

Stocking Density
0 kg N / ha

General Options

Fields next to watercourses (%)	40
Area of organic soils (%)	10

Field Boundaries	%
Hedge	10
Wall	35
Fence	35
Other	20

Dirty Water Options

- ◉ Minimal dirty water collected and sent to dirty water store
- ○ Yard runoff and parlour washings sent to dirty water store
- ○ Yard runoff and parlour washings sent to slurry store

Farm type for estimation of method implementation

- ○ Intensive Grazing
- ○ Extensive Grazing
- ◉ Other

Grazing Options

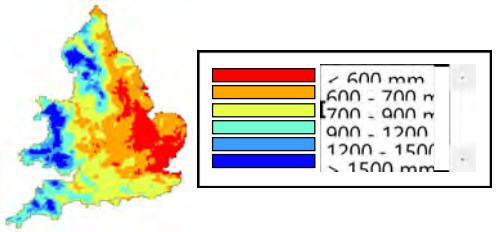
- ☐ Livestock have access to watercourses whilst grazing
- ☐ Livestock cross water between fields and yard

Cropping	Area (ha)	Fertilisers Applied		PPPs (% Typical)	Manure Received						Manure Details						Pesticide Details					
		N (kg/ha)	P_2O_5 (kg/ha)		Cattle Slurry (%)	Cattle & Sheep FYM (%)	Pig Slurry (%)	Pig FYM (%)	Poultry Muck (%)	Dirty Water (%)	Slurry (t/ha)	FYM (t/ha)	Litter (t/ha)	Dirty Water (t/ha)	Manure Total N (kg/ha)	Manure P (kg/ha)	Fungicide (% PPPs)	Herbicide (% PPPs)	Insecticide (% PPPs)	Growth Regulator (% PPPs)	Molluscicide (% PPPs)	Spray Trips
Permanent Pasture																						
Rotational Grassland																						
Rough Grazing																						
Winter Wheat	8.0	200	67								0.0	0.0	0.0	0.0	0.0	0.0						
Winter Barley																						
Spring Barley																						
Winter OSR	4.0	220	0								0.0	0.0	0.0	0.0	0.0	0.0						
Maize	10.0	150	55								0.0	0.0	0.0	0.0	0.0	0.0						
Potatoes	6.0	200	170								0.0	0.0	0.0	0.0	0.0	0.0						
Sugar Beet																						
Peas																						
Beans																						
Fodder Crops																						
Other Crops																						
Vegetables (Brassica)																						
Vegetables (Other)																						
Orchards																						
Soft Fruit																						
Bare Fallow																						
Set Aside																						
Woodland																						
Manure remaining for export off farm																						
Manure Use Warnings																						

Item	Pollutant	Source	Area	Pathway	Type	Timescale	Form	Value	Units	Area (ha)	Value (units / ha)	Drainage (mm)	Concentration	Units
Total	Nitrate	All	All	All	All	All	All	1,790.80	kg NO_3-N	28	63.96	381	16.80	mg NO_3-N / l
Total	Phosphorus	All	All	All	All	All	All	4.56	kg P	28	0.16	381	0.04	mg P / l
Summary	Nitrate	All	Arable	All	All	All	All	1,790.80		28	63.96	381	16.80	mg NO3-N / l
Summary	Nitrate	All	Grass	All	All	All	All	0.00		0	-	0	-	mg NO3-N / l
Summary	Nitrate	All	Rough	All	All	All	All	0.00		0	-	0	-	mg NO3-N / l
Summary	Nitrate	All	Other	All	All	All	All	0.00		28	0.00	-	-	mg NO3-N / l
Summary	Phosphorus	All	Arable	All	All	All	All	4.56		28	0.16	381	0.04	mg P / l
Summary	Phosphorus	All	Grass	All	All	All	All	0.00		0	-	0	-	mg P / l
Summary	Phosphorus	All	Rough	All	All	All	All	0.00		0	-	0	-	mg P / l
Summary	Phosphorus	All	Other	All	All	All	All	0.00		28	0.00	-	-	mg P / l
Component	Nitrate	Chemical	Arable	Runoff	Fertiliser	Short	Dissolved	40.52						
Component	Nitrate	Chemical	Arable	Runoff	Fertiliser	Medium	Dissolved	34.10						
Component	Nitrate	Chemical	Arable	Leaching	Fertiliser	Medium	Dissolved	786.15						
Component	Nitrate	Land	Arable	Runoff	Soil	Medium	Dissolved	38.84						
Component	Nitrate	Land	Arable	Leaching	Soil	Medium	Dissolved	891.20						
Component	Phosphorus	Chemical	Arable	Runoff	Fertiliser	Short	Dissolved	0.48						
Component	Phosphorus	Land	Arable	Runoff	Soil	Short	Dissolved	0.24						
Component	Phosphorus	Land	Arable	Leaching	Soil	Short	Dissolved	1.31						
Component	Phosphorus	Land	Arable	Runoff	Soil	Short	Particulate	2.53						

TYPICAL POLYTUNNEL FARMSCOPER RESULTS

1 Select Climate



FARMSCOPER Create

ADAS

2 Select Soil

Soil Type
- (•) Free Draining
- ( ) Other

Drain Status
- [ ] Drained for Arable Use
- [ ] Drained for Grassland Use

3 Select Farm Type

- Blank Farm
- Dairy
- Lowland Grazing
- Upland Grazing
- Mixed Livestock
- Outdoor Pig
- Indoor Pig
- Specialist Poultry
- Roots & Combinable
- Roots & Combinable with Poultry Manure
- Mixed Combinable
- Mixed Combinable with Pig Manure
- Winter Combinable
- Winter Combinable with Pig Manure
- Horticulture
- Poultry plus Roots & Combinable
- Indoor Pigs plus Mixed Combinable
- Indoor Pigs plus Winter Combinable

4 Economics

	Current Cost data loaded
File Name:	FARMSCOPER4_Cost.xls
File Date:	28/07/2017 14:27
Year Selected:	2013

5 View Results

Options

Farm Built

Display Options

- ☐ Dairy
- ☐ Beef
- ☐ Sheep
- ☐ Indoor Pigs
- ☐ Outdoor Pigs
- ☐ Poultry
- ☐ Imported Manure
- ☑ Cropping

☐ Show more detail for Livestock

☑ Show more detail for Cropping

Stocking Density
0 kg N / ha

General Options

Fields next to watercourses (%)	40
Area of organic soils (%)	10

Dirty Water Options

- ◉ Minimal dirty water collected and sent to dirty water store
- ○ Yard runoff and parlour washings sent to dirty water store
- ○ Yard runoff and parlour washings sent to slurry store

Farm type for estimation of method implementation

- ○ Intensive Grazing
- ○ Extensive Grazing
- ◉ Other

Field Boundaries	%
Hedge	10
Wall	35
Fence	35
Other	20

Grazing Options

- ☐ Livestock have access to watercourses whilst grazing
- ☐ Livestock cross water between fields and yard

Cropping	Area (ha)	Fertilisers Applied		PPPs	Manure Received						Manure Details						Pesticide Details					
		N (kg/ha)	P_2O_5 (kg/ha)	(% Typical)	Cattle Slurry (%)	Cattle & Sheep FYM (%)	Pig Slurry (%)	Pig FYM (%)	Poultry Muck (%)	Dirty Water (%)	Slurry (t/ha)	FYM (t/ha)	Litter (t/ha)	Dirty Water (t/ha)	Manure Total N (kg/ha)	Manure P (kg/ha)	Fungicide (% PPPs)	Herbicide (% PPPs)	Insecticide (% PPPs)	Growth Regulator (% PPPs)	Molluscicide (% PPPs)	Spray Trips
Permanent Pasture	28.0	74	30								0.0	0.0	0.0	0.0	0.0	0.0						
Rotational Grassland																						
Rough Grazing																						
Winter Wheat																						
Winter Barley																						
Spring Barley																						
Winter OSR																						
Maize																						
Potatoes																						
Sugar Beet																						
Peas																						
Beans																						
Fodder Crops																						
Other Crops																						
Vegetables (Brassica)																						
Vegetables (Other)																						
Orchards																						
Soft Fruit																						
Bare Fallow																						
Set Aside																						
Woodland																						
Manure remaining for export off farm																						
Manure Use Warnings																						

Item	Pollutant	Source	Area	Pathway	Type	Timescale	Form	Value	Units	Area (ha)	Value (units / ha)	Drainage (mm)	Concentration	Units
Total	Nitrate	All	All	All	All	All	All	274.11	kg NO_3-N	28	9.79	304	3.22	mg NO_3-N / l
Total	Phosphorus	All	All	All	All	All	All	2.70	kg P	28	0.10	304	0.03	mg P / l
Summary	Nitrate	All	Arable	All	All	All	All	0.00		0	-	0	-	mg NO3-N / l
Summary	Nitrate	All	Grass	All	All	All	All	274.11		28	9.79	304	3.22	mg NO3-N / l
Summary	Nitrate	All	Rough	All	All	All	All	0.00		0	-	0	-	mg NO3-N / l
Summary	Nitrate	All	Other	All	All	All	All	0.00		28	0.00	-	-	mg NO3-N / l
Summary	Phosphorus	All	Arable	All	All	All	All	0.00		0	-	0	-	mg P / l
Summary	Phosphorus	All	Grass	All	All	All	All	2.70		28	0.10	304	0.03	mg P / l
Summary	Phosphorus	All	Rough	All	All	All	All	0.00		0	-	0	-	mg P / l
Summary	Phosphorus	All	Other	All	All	All	All	0.00		28	0.00	-	-	mg P / l
Component	Nitrate	Chemical	Grass	Runoff	Fertiliser	Short	Dissolved	9.91						
Component	Nitrate	Chemical	Grass	Runoff	Fertiliser	Medium	Dissolved	4.50						
Component	Nitrate	Chemical	Grass	Leaching	Fertiliser	Medium	Dissolved	145.33						
Component	Nitrate	Land	Grass	Runoff	Soil	Medium	Dissolved	3.56						
Component	Nitrate	Land	Grass	Leaching	Soil	Medium	Dissolved	110.81						
Component	Phosphorus	Chemical	Grass	Runoff	Fertiliser	Short	Dissolved	0.98						
Component	Phosphorus	Land	Grass	Runoff	Soil	Short	Dissolved	0.17						
Component	Phosphorus	Land	Grass	Leaching	Soil	Short	Dissolved	0.78						
Component	Phosphorus	Land	Grass	Runoff	Soil	Short	Particulate	0.77						

APPENDIX D
URBAN N EXPORT CALCULATIONS

Calculation of Urban N Export for Biddlestone Farm

Step 1 **Equation 1 - The Wallingfor Modified Rational Method of calculating urban runoff**

$$L = R * Pr$$

Where: L = annual avereage runoff (mm)
R = annual aveagre rainfall (mm)
Pr = percentage runoff (%)

$$Pr = 0.829 * PIMP + 0.078 * U - 20.7$$

$PIMP$ = the percentage of land that is impervious (whole number)
$\boldsymbol{U}$ = catchment wetness index. Calculated by

$$U = -129.5 + (0.424 * R) - (2.28 * 10^{-4} * R^2) - (4.56 * 10^{-8} * R^3)$$

Biddlestone Farm

L	361	mm	Calculated from equation given above
R	740	mm	Obtained from FEH Web Service
Pr	*49*	*%*	Calculated from equation given above
PIMP	80	%	Assumption for urban area impermeable land
U	41		Calculated from equation given above

Step 2 **Calculation of urban runoff of nitrogen within the Wye catchment**

$$N\ Export = L * TN\ Loss$$

Where: *N Export* = nitrogen loss from urban areas at Biddlestone Farm (N/ha/year)
L = annual avereage runoff (l/ha/year)
TN Loss = total nitrogen loss from urban areas (mg/ha/year)

Biddlestone Farm

N Export	10.8	kg N/ha/year	Calculated from equation given above
L	361	mm	Calculated above
TN Loss	*3*	*mg/l*	

APPENDIX E
NITROGEN BUDGET CALCULATIONS

Nitrogen Budget Calculator Tool

Introduction

This spreadsheet contains the Natural England tool that can be used to calculate the nitrogen budget for a proposed development. The Natural England tool has been expanded to include additional land uses including water and polytunnels. A site specific land use has been applied for the development site existing nutrient application.

There are four stages to this tool:
- Stage 1: Calculating the additional nitrogen load from development wastewater
- Stage 2: Calculating the nitrogen load from the existing land use
- Stage 3: Calculating the nitrogen load from the proposed land use
- Stage 4: Calculate the net change in nitrogen load from the proposed development

Data Requirements

The following information is required to use the tool::
- Number of housing units/ additional population proposed
- The method of treatment for wastewater generated
- The total area (in hectares) of the site
- Current land use of the Site (in hectares)
- Proposed land use of the Site (in hectare)

Stage 1 Calculate total nitrogen (TN) load from development wastewater

Step 1 **Calculate additional population**

Entre the number of units proposed	0
Net population increase per unit	2.4
Total net population increase generated by the development	*0*

Step 2 **Calculate total nitrogen prior to PTP treatment**

Total Nitrogen per person per year	3.5
Total Nitrogen prior to treatment	*0*

Step 3 **Calculate total nitrogen after PTP treatment**

Package Treatment Plant removal efficiency (%)	70%
Total wastewater volume generated by the development (litres per day)	*0*

Step 4 **Calculate acceptable N loading**

Background concentration prior to 1960s (mg per litre)	2
Water use (l per day per person)	110
Acceptable N loading (mg TN per day)	*0*
Acceptable N loading (kg TN per year)	*0.0*

Step 5 **Calculate total nitrogen load from additional population**

PTP Total Nitrogen Load (kg TN per year)	0.0

Stage 2 Calculate nitrogen load from current land use

Step 1 **Total area of development site**

Entre the total area of the development site (hectares)	41

Step 2 **Identify current land uses of the development site**

Entre area currently used for urban development (hectares)	
Entre area currently used for open space / greenfield (hectares)	7
Entre area currently used for open woodland (hectares)	
Entre area currently used for community food growing (hectares)	
Entre area currently used for cereals (hectares)	
Entre area currently used for dairy (hectares)	
Entre area currently used for general cropping (hectares)	
Entre area currently used for horticulture (hectares)	
Entre area currently used for pig farming (hectares)	
Entre area currently used for lowland grazing (hectares)	
Entre area currently used for mixed farming (hectares)	
Entre area currently used for poultry farming (hectares)	
Entre area currently used for average catchment (hectares)	
Entre area currently used for water (hectares)	
Entre area currently used for Biddlestone arable (hectares)	34
Entre area currently used for polytunnel (hectares)	
Check that the sum total of land uses in Step 2 equals site area in Step 1	*41*

Step 3 **Calculate nitrogen load from current land usage**

Total Nitrogen load from current land usage kg per year	*526.3*

Stage 3 Calculate nitrogen load from future land uses

Step 1 **Total area of development site**

Entre the total area of the development site (hectares)	41

Step 2 **Identify current land uses of the development site**

Proposed area of urban development (hectares)	0.5
Proposed area of open space / greenfield (hectares)	12
Proposed area of open woodland (hectares)	
Proposed area of community food growing (hectares)	
Proposed area of cereals (hectares)	
Proposed area of dairy (hectares)	
Proposed area of general cropping (hectares)	
Proposed area of horticulture (hectares)	
Proposed area of pig farming (hectares)	
Proposed area of lowland grazing (hectares)	
Proposed area of mixed farming (hectares)	
Proposed area of poultry farming (hectares)	
Proposed area of average catchment (hectares)	
Proposed area of water (hectares)	1
Proposed area of Biddlestone Arable (hectares)	
Proposed area of Polytunnel (hectares)	28
Check that the sum total of land uses in Step 2 equals site area in Step 1	*41*

Step 3 **Calculate nitrogen load from current land usage**

Total Nitrogen load from current land usage kg per year	*124.8*

Stage 4 Calculate the net change in Nitrogen load from the proposed development

Step 1 **Identify Nitrogen load from wastewater**

Nitrogen leaving wastewater treatment works (kg per year)	0

Step 2 **Calculate net change in Nitrogen load from land use changes**

Total Nitrogen load from future land use (kg per year)	-401

Step 3 **Calculate total Nitrogen budget for the development site**

Nitrogen budget for the site (kg per year)	-401

Step 4 **Calculate precautionary buffer if Nitrogen budget exceeds zero**

Precautionary Nitrogen buffer (kg per year)	-401

Data tables utilised within the nitrogen budget calculator

Nitrogen Leaching Rates from Current Land Use - Natural England Look Up Table

Land Use	Leaching Rate (Nitrogen kg/ha/yr)
Urban Development	10.8
Open Space/ Greenfield	5
Woodland	5
Community Food Growing / Allotment	26.9
Cereals	31.2
Diary	36.2
General Cropping	25.4
Horticulture	29.2
Pig	70.4
Lowland Grazing	13.0
Mixed	28.3
Poultry	70.7
Average for catchment area	26.9
Greenfield	5.0

Site Specific Nitrogen Leaching Rate

Nitrogen Leaching Rate Identified from Farmscoper	Leaching Rate (kg/ha/yr)
Biddlestone Arable	14.4
Biddlestone Polytunnel	2.2

Nitrogen Leaching Rate Adapted from Herefordshire Phosphate Leaching Rates

Additional Land Use from Herefordshire Method	Leaching Rate (kg/ha/yr)
Water	0

APPENDIX F
PHOSPHORUS BUDGET CALCULATIONS

Herefordshire Council Phosphate Budget Calculator Tool

Introduction:
This spreadsheet contains a simple tool that can be used to calculate the phosphate budget for a new housing development.

The worksheets contained in this tool implement the methodology detailed in the Ricardo (2021) report: "*Herefordshire Council Interim Phosphate Delivery Plan - Stage 1 – Guidance on calculating phosphate budgets for new developments draining to the River Wye SAC*"

The phosphate budget is calculated in four stages, with each stage implemented in the following worksheets:

Stage 1 - calculate the new phosphate load to the River Wye SAC from wastewater
Stage 2 - calculate the phosphate load from current land use on the development site
Stage 3 - calculate the phosphate load from new land uses on the development site
Stage 4 - calculate the net change in phosphate load due to the new development

The inputs for each of these stages are included within each worksheet or are taken from the Wastewater Treatment Works (WwTW) and phosphorous export look up worksheets. Instructions about where user inputs are required are provided in the notes columns of each worksheet. The key below also provides a visual guide for required user inputs.

It is advisable to retain a default copy of this workbook which and "Save as" a new copy each time you calculate a budget, in case any of the formulae in the workbook are overwritten.

Key:

	Titles
	Fixed or calculated values
	Dropdown lists for user selection
	Values to be entered by a user
	Default values that are only to be edited in exceptional circumstances

Note: the values already included in this tool have been chosen based on research to determine suitable inputs to the phosphate budget that meet the HRA tests of beyond reasonable scientific doubt, in perpetuity (practically speaking this is 80-125 years) and in accordance with the precautionary principle. It is highly unadvisable to edit the values in this tool without a sufficient evidence base to justify any changes.
Two nutrient budget calculators will need to be completed where WwTW permits are changing for the period before 2025 and after 2025. In the 'Stage 1' worksheet the user is asked if the budget calculator being completed for the period before or after 2025. This needs to be answered appropriately.

The WwTW Catchments worksheet contains files that will open in Google Earth Pro to check which WwTWs catchment your development will fall in/near. WwTW

Before starting the budget calculator:
Fill in the table below. Instructions for how to obtain these values can be found underneath:
Note: if your development *is not* being built on former agricultural land, you do not need to find the catchment or soil drainage type.

Table 1:

Parameter	Value
Catchment	Wye OC
Soil drainage type	Freely draining
Annual average rainfall (mm)	700.1 - 750

Instructions for Table 1:
1) Find the Operational Catchment that the development is located within
a) Go to this link: http://environment.data.gov.uk/catchment-planning/
b) Search the location by place name, postcode etc. This will give a high level view of the area. Use the zoom feature to find the exact location of the development.
c) Click on the light blue area on the map in which the development is located. This will bring the user to the Operational Catchment page
d) Select either the 'Arrow Lugg and Frome', 'Monnow', or the 'Wye OC' from the drop down in the table
Note: only developments within the Wye Management Catchment need to complete a nutrient budget calculator. The Three main Operational Catchments that are within the Wye Management Catchment and the Herefordshire Council boundary are the 'Arrow Lugg and Frome', the 'Monnow', and the 'Wye OC'.
If development is located within the 'Wye - Ithon to Hay' catchment then the closest catchment out of the Wye OC and the Monnow should be selected.

2) Find the drainage associated with the predominant soil type within development site
a) Go to this link: http://www.landis.org.uk/soilscapes/#.
b) Find the site location on the map by using the search bar on the right side of the map in the 'Search' tab. 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) Select relevant soil drainage type from the drop down list in the table

3) Find the annual average rainfall that the development will receive using the National River Flow Archive
a) Go to this link: https://nrfa.ceh.ac.uk/data/station/spatial/55023
b) This link will bring the user to the Wye at Redbrook flow gauge catchment information page.
c) 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.
d) Zoom in on the map to find the location of the development and fin the corresponding rainfall range from the Legend.
e) Select the rainfall band from the drop down list in the table.

Stage 2: Calculate the additional phosphorus loading (kg/year) associated with the increased wastewater generation in the new development

This stage calculates the phosphorous loading associated with the increased household water usage within the development. The user should enter values in Table 1.1 only. When the user selects a WwTW that the development drains to, the adjacent cell finds the relevant phosphorous value in the 'WwTW look up' worksheet. For unpermitted WwTWs a value of 5 mg P/L has been assumed, though this may be edited in the future if Dwr Cymru provide further monitoring data. If the WwTW that the development drains to is not in the drop down list, select "No permit".

If a package treatment plant (PTP) or septic tank is being used, select this option from the dropdown list. If the manufacturer has provided a phosphorus concentration in the final effluent then enter this into G19. If a value has not been provided, do not edit cell G19 and leave the default values.

Is this being completed for the period before or after 2025? Answer: Before

Table 1.1:

Development specific inputs			
Inputs	**Value**	**Unit**	**Notes**
Occupancy rate	2.3	persons/dwelling	Keep as 2.3 unless exact value is known
Water use	120	litres/day	Keep as 120 unless other efficiency measures are used. Although this is 10 litres above the Local Plan value, it accounts for any potential changes.
Development Proposal		dwellings	Enter in G13 the number of dwellings being built
Package treatment plant	9.7	mg P/l	Select a WwTW to which wastewater is being discharged using dropdown in G14.

Table 1.2:

Stage 1 wastewater load		
Variable	**Value**	**Unit**
Additional population	0	People
Wastewater by development	0	litres/day
TP discharge from WwTW	0	mg TP/day
Convert to kg/TP/d	0	kg TP/day
Convert to kg/TP/yr	0.00	kg TP/yr
Total wastewater TP load	**0.00**	**kg TP/yr**

Stage 2: Calculate existing P load from current land use

This stage calculates the phosphorous loading from the current land use on the development site.
The user should enter values for the type of land use and the area of each type of land use in Table 2.1.

Table 2.1:

Phosphate loading from existing land use			
Type	**Area (ha)**	**Annual P export (kg/ha)**	**Notes**
Biddlestone Arable	34	5.44	Select existing land use type in drop down list in E11:E20, starting with E11. Enter the area of the selected land type in corresponding cell in column F If results are saying #N/A, check that the correct values have been entered in Table 1 (Introduction) If they are still #N/A double check you have the right area on the maps you used to enter the values in Table 1 (introduction) If still #N/A then manually look up the most similar combination of land type to the values entered in Table 1 and the Farm Type in Table 2.1 in 'Stage 2 and 3 lookups'
Greenspace	7	0.14	
Total	**41.00**	**5.58**	

Stage 3: Adjust load to account for land uses within the proposed development

This stage calculates the phosphorous loading associated with the new land uses within the development's redline boundary. The user should select relevant land uses and their areas within the development in Table 3.1.

Table 3.1:

Phosphorus losses from new land uses			
Type	**Area (ha)**	**Phosphorus loading (kg/ha)**	**Notes**
Biddlestone Polytunnel	28.0	2.80	Select new land use type in drop down list in D10:19, starting with D10. Enter the area of the selected land type in corresponding cell in column E
Greenspace	11.5	0.23	
Commercial/industrial urban land	0.5	0.50	
Water	1.0	0.00	
Total	**41**	**3.53**	

Stage 4: Net Change and calculation of the budget

This stage calculates the total amount of phosphorus to mitigate for a development to be nutrient neutral. No values should be entered in Table 4.1. Provided all other steps are fully complete, this will be calculated automatically.

Proceed with caution - total area of the current land use does not match the area of proposed land uses within the development area.

Table 4.1:

Input	Value (kg TP/year)
New P to WwTW	0.00
Net land use P change	-2.05
P budget	-2.05
P budget + 20% buffer	-2.46

The total amount of phosphorus to mitigate is:

-2.46 kg/year

Catchment	Farmscoper Farm Term	Climate	Farmscoper Soil Drainage Term	Lookup	Phosphoruous export coefficient
Arrow	Cereals	600to700	FreeDrain	Arrow|Cereals|600to700|FreeDrain	0.05
Arrow	Cereals	600to700	DrainedAr	Arrow|Cereals|600to700|DrainedAr	0.32
Arrow	Cereals	600to700	DrainedArGr	Arrow|Cereals|600to700|DrainedArGr	0.57
Arrow	Cereals	700to900	FreeDrain	Arrow|Cereals|700to900|FreeDrain	0.13
Arrow	Cereals	700to900	FreeDrain	Arrow|Cereals|700to900|FreeDrain	0.13
Arrow	Cereals	700to900	DrainedAr	Arrow|Cereals|700to900|DrainedAr	0.68
Arrow	Cereals	700to900	DrainedArGr	Arrow|Cereals|700to900|DrainedArGr	1.05
Arrow	Cereals	700to900	DrainedArGr	Arrow|Cereals|700to900|DrainedArGr	1.05
Arrow	Cereals	900to1200	FreeDrain	Arrow|Cereals|900to1200|FreeDrain	0.29
Arrow	Cereals	900to1200	FreeDrain	Arrow|Cereals|900to1200|FreeDrain	0.29
Arrow	General	600to700	FreeDrain	Arrow|General|600to700|FreeDrain	0.04
Arrow	General	600to700	DrainedAr	Arrow|General|600to700|DrainedAr	0.24
Arrow	General	600to700	DrainedArGr	Arrow|General|600to700|DrainedArGr	0.45
Arrow	General	700to900	FreeDrain	Arrow|General|700to900|FreeDrain	0.10
Arrow	General	700to900	FreeDrain	Arrow|General|700to900|FreeDrain	0.10
Arrow	General	700to900	DrainedAr	Arrow|General|700to900|DrainedAr	0.10
Arrow	General	700to900	DrainedAr	Arrow|General|700to900|DrainedAr	0.48
Arrow	General	700to900	DrainedArGr	Arrow|General|700to900|DrainedArGr	0.81
Arrow	General	700to900	DrainedArGr	Arrow|General|700to900|DrainedArGr	0.81
Arrow	General	900to1200	FreeDrain	Arrow|General|900to1200|FreeDrain	0.22
Arrow	General	900to1200	FreeDrain	Arrow|General|900to1200|FreeDrain	0.22
Arrow	General	900to1200	DrainedAr	Arrow|General|900to1200|DrainedAr	0.97
Arrow	Horticulture	600to700	FreeDrain	Arrow|Horticulture|600to700|FreeDrain	0.02
Arrow	Horticulture	600to700	DrainedAr	Arrow|Horticulture|600to700|DrainedAr	0.14
Arrow	Horticulture	600to700	DrainedArGr	Arrow|Horticulture|600to700|DrainedArGr	0.26
Arrow	Horticulture	700to900	FreeDrain	Arrow|Horticulture|700to900|FreeDrain	0.06
Arrow	Horticulture	700to900	FreeDrain	Arrow|Horticulture|700to900|FreeDrain	0.06
Arrow	Horticulture	700to900	DrainedAr	Arrow|Horticulture|700to900|DrainedAr	0.29
Arrow	Horticulture	700to900	DrainedArGr	Arrow|Horticulture|700to900|DrainedArGr	0.47
Arrow	Horticulture	900to1200	FreeDrain	Arrow|Horticulture|900to1200|FreeDrain	0.13
Arrow	Horticulture	900to1200	FreeDrain	Arrow|Horticulture|900to1200|FreeDrain	0.13
Arrow	Pig	600to700	DrainedAr	Arrow|Pig|600to700|DrainedAr	0.33
Arrow	Pig	700to900	FreeDrain	Arrow|Pig|700to900|FreeDrain	0.16
Arrow	Pig	700to900	DrainedAr	Arrow|Pig|700to900|DrainedAr	0.65
Arrow	Pig	700to900	DrainedArGr	Arrow|Pig|700to900|DrainedArGr	0.99
Arrow	Poultry	600to700	DrainedAr	Arrow|Poultry|600to700|DrainedAr	0.48
Arrow	Poultry	700to900	FreeDrain	Arrow|Poultry|700to900|FreeDrain	0.37
Arrow	Poultry	700to900	FreeDrain	Arrow|Poultry|700to900|FreeDrain	0.36
Arrow	Poultry	700to900	DrainedAr	Arrow|Poultry|700to900|DrainedAr	0.88
Arrow	Poultry	700to900	DrainedArGr	Arrow|Poultry|700to900|DrainedArGr	1.50
Arrow	Poultry	900to1200	FreeDrain	Arrow|Poultry|900to1200|FreeDrain	0.59
Arrow	Poultry	900to1200	FreeDrain	Arrow|Poultry|900to1200|FreeDrain	0.58
Arrow	Dairy	600to700	FreeDrain	Arrow|Dairy|600to700|FreeDrain	0.16
Arrow	Dairy	600to700	DrainedAr	Arrow|Dairy|600to700|DrainedAr	0.28
Arrow	Dairy	700to900	FreeDrain	Arrow|Dairy|700to900|FreeDrain	0.24
Arrow	Dairy	700to900	DrainedAr	Arrow|Dairy|700to900|DrainedAr	0.45
Arrow	Dairy	700to900	DrainedArGr	Arrow|Dairy|700to900|DrainedArGr	1.54
Arrow	Dairy	900to1200	FreeDrain	Arrow|Dairy|900to1200|FreeDrain	0.37
Arrow	LFA	700to900	FreeDrain	Arrow|LFA|700to900|FreeDrain	0.12
Arrow	LFA	700to900	FreeDrain	Arrow|LFA|700to900|FreeDrain	0.12
Arrow	LFA	700to900	DrainedAr	Arrow|LFA|700to900|DrainedAr	0.16
Arrow	LFA	700to900	DrainedArGr	Arrow|LFA|700to900|DrainedArGr	0.70
Arrow	LFA	700to900	DrainedArGr	Arrow|LFA|700to900|DrainedArGr	0.69
Arrow	LFA	900to1200	FreeDrain	Arrow|LFA|900to1200|FreeDrain	0.21
Arrow	LFA	900to1200	FreeDrain	Arrow|LFA|900to1200|FreeDrain	0.21
Arrow	LFA	900to1200	DrainedAr	Arrow|LFA|900to1200|DrainedAr	0.27
Arrow	LFA	900to1200	DrainedAr	Arrow|LFA|900to1200|DrainedAr	0.27
Arrow	Lowland	600to700	FreeDrain	Arrow|Lowland|600to700|FreeDrain	0.09
Arrow	Lowland	600to700	DrainedAr	Arrow|Lowland|600to700|DrainedAr	0.12
Arrow	Lowland	600to700	DrainedArGr	Arrow|Lowland|600to700|DrainedArGr	0.55
Arrow	Lowland	700to900	FreeDrain	Arrow|Lowland|700to900|FreeDrain	0.15
Arrow	Lowland	700to900	FreeDrain	Arrow|Lowland|700to900|FreeDrain	0.15
Arrow	Lowland	700to900	DrainedAr	Arrow|Lowland|700to900|DrainedAr	0.20
Arrow	Lowland	700to900	DrainedAr	Arrow|Lowland|700to900|DrainedAr	0.20
Arrow	Lowland	700to900	DrainedArGr	Arrow|Lowland|700to900|DrainedArGr	0.88
Arrow	Lowland	700to900	DrainedArGr	Arrow|Lowland|700to900|DrainedArGr	0.87
Arrow	Lowland	900to1200	FreeDrain	Arrow|Lowland|900to1200|FreeDrain	0.24
Arrow	Lowland	900to1200	FreeDrain	Arrow|Lowland|900to1200|FreeDrain	0.24
Arrow	Lowland	900to1200	DrainedAr	Arrow|Lowland|900to1200|DrainedAr	0.34
Arrow	Mixed	600to700	FreeDrain	Arrow|Mixed|600to700|FreeDrain	0.07
Arrow	Mixed	600to700	DrainedAr	Arrow|Mixed|600to700|DrainedAr	0.23
Arrow	Mixed	600to700	DrainedArGr	Arrow|Mixed|600to700|DrainedArGr	0.58
Arrow	Mixed	700to900	FreeDrain	Arrow|Mixed|700to900|FreeDrain	0.14
Arrow	Mixed	700to900	FreeDrain	Arrow|Mixed|700to900|FreeDrain	0.14
Arrow	Mixed	700to900	DrainedAr	Arrow|Mixed|700to900|DrainedAr	0.46
Arrow	Mixed	700to900	DrainedAr	Arrow|Mixed|700to900|DrainedAr	0.46
Arrow	Mixed	700to900	DrainedArGr	Arrow|Mixed|700to900|DrainedArGr	0.99
Arrow	Mixed	700to900	DrainedArGr	Arrow|Mixed|700to900|DrainedArGr	0.98
Arrow	Mixed	900to1200	FreeDrain	Arrow|Mixed|900to1200|FreeDrain	0.27
Arrow	Mixed	900to1200	FreeDrain	Arrow|Mixed|900to1200|FreeDrain	0.27
Monnow	Cereals	700to900	FreeDrain	Monnow|Cereals|700to900|FreeDrain	0.13
Monnow	Cereals	700to900	DrainedAr	Monnow|Cereals|700to900|DrainedAr	0.67
Monnow	Cereals	700to900	DrainedArGr	Monnow|Cereals|700to900|DrainedArGr	1.03
Monnow	Cereals	900to1200	DrainedAr	Monnow|Cereals|900to1200|DrainedAr	1.38
Monnow	General	700to900	FreeDrain	Monnow|General|700to900|FreeDrain	0.10
Monnow	General	700to900	FreeDrain	Monnow|General|700to900|FreeDrain	0.10
Monnow	General	700to900	DrainedAr	Monnow|General|700to900|DrainedAr	0.44
Monnow	General	700to900	DrainedAr	Monnow|General|700to900|DrainedAr	0.44
Monnow	General	700to900	DrainedArGr	Monnow|General|700to900|DrainedArGr	0.75
Monnow	General	900to1200	FreeDrain	Monnow|General|900to1200|FreeDrain	0.21
Monnow	General	900to1200	DrainedAr	Monnow|General|900to1200|DrainedAr	0.88
Monnow	General	900to1200	DrainedAr	Monnow|General|900to1200|DrainedAr	0.88
Monnow	General	1200to1500	FreeDrain	Monnow|General|1200to1500|FreeDrain	0.37
Monnow	General	1200to1500	DrainedAr	Monnow|General|1200to1500|DrainedAr	1.29
Monnow	General	1200to1500	DrainedArGr	Monnow|General|1200to1500|DrainedArGr	1.80
Monnow	Horticulture	700to900	FreeDrain	Monnow|Horticulture|700to900|FreeDrain	0.06
Monnow	Horticulture	700to900	DrainedAr	Monnow|Horticulture|700to900|DrainedAr	0.29
Monnow	Horticulture	700to900	DrainedAr	Monnow|Horticulture|700to900|DrainedAr	0.29
Monnow	Horticulture	700to900	DrainedArGr	Monnow|Horticulture|700to900|DrainedArGr	0.50
Monnow	Horticulture	900to1200	FreeDrain	Monnow|Horticulture|900to1200|FreeDrain	0.14
Monnow	Horticulture	900to1200	DrainedAr	Monnow|Horticulture|900to1200|DrainedAr	0.58
Monnow	Horticulture	1200to1500	FreeDrain	Monnow|Horticulture|1200to1500|FreeDrain	0.25
Monnow	Horticulture	1200to1500	DrainedAr	Monnow|Horticulture|1200to1500|DrainedAr	0.84
Monnow	Pig	600to700	DrainedAr	Monnow|Pig|600to700|DrainedAr	0.09
Monnow	Pig	700to900	FreeDrain	Monnow|Pig|700to900|FreeDrain	0.04
Monnow	Pig	700to900	DrainedAr	Monnow|Pig|700to900|DrainedAr	0.13
Monnow	Poultry	700to900	FreeDrain	Monnow|Poultry|700to900|FreeDrain	0.34
Monnow	Poultry	700to900	DrainedAr	Monnow|Poultry|700to900|DrainedAr	0.80
Monnow	Poultry	700to900	DrainedArGr	Monnow|Poultry|700to900|DrainedArGr	1.42
Monnow	Dairy	700to900	FreeDrain	Monnow|Dairy|700to900|FreeDrain	0.23
Monnow	Dairy	700to900	DrainedAr	Monnow|Dairy|700to900|DrainedAr	0.42
Monnow	Dairy	900to1200	DrainedAr	Monnow|Dairy|900to1200|DrainedAr	0.70
Monnow	LFA	700to900	FreeDrain	Monnow|LFA|700to900|FreeDrain	0.13
Monnow	LFA	700to900	FreeDrain	Monnow|LFA|700to900|FreeDrain	0.13
Monnow	LFA	700to900	DrainedAr	Monnow|LFA|700to900|DrainedAr	0.16
Monnow	LFA	700to900	DrainedAr	Monnow|LFA|700to900|DrainedAr	0.16
Monnow	LFA	900to1200	FreeDrain	Monnow|LFA|900to1200|FreeDrain	0.21
Monnow	LFA	900to1200	FreeDrain	Monnow|LFA|900to1200|FreeDrain	0.21
Monnow	LFA	900to1200	DrainedAr	Monnow|LFA|900to1200|DrainedAr	0.26
Monnow	LFA	900to1200	DrainedAr	Monnow|LFA|900to1200|DrainedAr	0.26
Monnow	LFA	900to1200	DrainedArGr	Monnow|LFA|900to1200|DrainedArGr	1.25
Monnow	LFA	1200to1500	FreeDrain	Monnow|LFA|1200to1500|FreeDrain	0.30
Monnow	LFA	1200to1500	DrainedAr	Monnow|LFA|1200to1500|DrainedAr	0.35
Monnow	LFA	1200to1500	DrainedArGr	Monnow|LFA|1200to1500|DrainedArGr	1.75
Monnow	LFA	Over1500	DrainedArGr	Monnow|LFA|Over1500|DrainedArGr	2.58
Monnow	Lowland	700to900	FreeDrain	Monnow|Lowland|700to900|FreeDrain	0.14
Monnow	Lowland	700to900	FreeDrain	Monnow|Lowland|700to900|FreeDrain	0.14

Operational Catchment	Farmscoper equivalent
Arrow Lugg and Frome	Arrow
Monnow	Monnow
Wye OC	Wye OC

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

Low	High	Farmscoper Rainfall Values lookup
600	700	600to700
700	900	700to900
900	1200	900to1200
1200	1500	1200to1500
1500	9999	Over1500

Rainfall band	Low	High	Middle
508 - 525	508	525	516.5
525.1 - 550	525	550	537.5
550.1 - 575	550	575	562.5
575.1 - 600	575	600	587.5
600.1 - 625	600	625	612.5
625.1 - 650	625	650	637.5
650.1 - 675	650	675	662.5
675.1 - 700	675	700	687.5
700.1 - 750	700	750	725
750.1 - 800	750	800	775
800.1 - 850	800	850	825
850.1 - 900	850	900	875
900.1 - 950	900	950	925
950.1 - 1,000	950	1,000	975
1,000.1 - 1,100	1000	1,100	1050
1,100.1 - 1,200	1100	1,200	1150
1,200.1 - 1,400	1200	1,400	1300
1,400.1 - 1,600	1400	1,600	1500
1,600.1 - 2,000	1600	2,000	1800
2,000.1 - 2,400	2000	2,400	2200
2,400.1 - 3,000	2400	3,000	2700
3,000.1 - 4,000	3000	4,000	3500
4,000.1 - 5,500	4000	5,500	4750

Farm types
Cereals
General
Horticulture
Pig
Poultry
Dairy
LFA
Lowland
Mixed
Greenspace
Woodland
Biddlestone Arable
Water
Residential urban land
Commercial/i ndustrial urban land
Open urban land
Community food growing

Stage 2: General Site descriptors Lookup	
Catchment Lookup	Wye OC
Soil Drainage Type lookup	FreeDrain
Intermittent Rainfall Value lookup:	
Rainfall value Middle:	725
Farmscoper equivalent:	700to900

Stage 2: Farm Type lookups			
1	Biddlestone Arable	|||Biddlestone Arable	0.16
2	Greenspace	|||Greenspace	0.02
3	0	Wye OC||700to900|FreeDrain	#N/A
4	0	Wye OC||700to900|FreeDrain	#N/A
5	0	Wye OC||700to900|FreeDrain	#N/A
6	0	Wye OC||700to900|FreeDrain	#N/A
7	0	Wye OC||700to900|FreeDrain	#N/A
8	0	Wye OC||700to900|FreeDrain	#N/A
9	0	Wye OC||700to900|FreeDrain	#N/A
10	0	Wye OC||700to900|FreeDrain	#N/A

Urban Runoff Lookups:	
UCWI	40.68
Urban Runoff	48.79
Residential P leaching EMC	0.42
Commercial/industrial P leaching EMC	0.30
Open urban P leaching EMC	0.22
Residential urban land	1.49
Commercial/i ndustrial urban land	1.06
Open urban land	0.78

Monnow	Lowland	700to900	DrainedAr	Monnow|Lowland|700to900|DrainedAr	0.17
Monnow	Lowland	700to900	DrainedAr	Monnow|Lowland|700to900|DrainedAr	0.17
Monnow	Lowland	700to900	DrainedArGr	Monnow|Lowland|700to900|DrainedArGr	0.78
Monnow	Lowland	900to1200	FreeDrain	Monnow|Lowland|900to1200|FreeDrain	0.22
Monnow	Lowland	900to1200	DrainedAr	Monnow|Lowland|900to1200|DrainedAr	0.27
Monnow	Lowland	900to1200	DrainedAr	Monnow|Lowland|900to1200|DrainedAr	0.26
Monnow	Lowland	1200to1500	FreeDrain	Monnow|Lowland|1200to1500|FreeDrain	0.31
Monnow	Lowland	1200to1500	DrainedAr	Monnow|Lowland|1200to1500|DrainedAr	0.35
Monnow	Mixed	700to900	FreeDrain	Monnow|Mixed|700to900|FreeDrain	0.13
Monnow	Mixed	700to900	DrainedAr	Monnow|Mixed|700to900|DrainedAr	0.42
Monnow	Mixed	700to900	DrainedAr	Monnow|Mixed|700to900|DrainedAr	0.42
Monnow	Mixed	700to900	DrainedArGr	Monnow|Mixed|700to900|DrainedArGr	0.94
Monnow	Mixed	900to1200	FreeDrain	Monnow|Mixed|900to1200|FreeDrain	0.25
Monnow	Mixed	900to1200	DrainedAr	Monnow|Mixed|900to1200|DrainedAr	0.84
Monnow	Mixed	1200to1500	DrainedAr	Monnow|Mixed|1200to1500|DrainedAr	1.20
Wye OC	Cereals	600to700	FreeDrain	Wye OC|Cereals|600to700|FreeDrain	0.05
Wye OC	Cereals	600to700	DrainedAr	Wye OC|Cereals|600to700|DrainedAr	0.33
Wye OC	Cereals	700to900	FreeDrain	Wye OC|Cereals|700to900|FreeDrain	0.13
Wye OC	Cereals	700to900	FreeDrain	Wye OC|Cereals|700to900|FreeDrain	0.13
Wye OC	Cereals	700to900	DrainedAr	Wye OC|Cereals|700to900|DrainedAr	0.71
Wye OC	Cereals	700to900	DrainedArGr	Wye OC|Cereals|700to900|DrainedArGr	1.07
Wye OC	Cereals	700to900	DrainedArGr	Wye OC|Cereals|700to900|DrainedArGr	1.07
Wye OC	Cereals	900to1200	FreeDrain	Wye OC|Cereals|900to1200|FreeDrain	0.29
Wye OC	Cereals	900to1200	FreeDrain	Wye OC|Cereals|900to1200|FreeDrain	0.29
Wye OC	Cereals	900to1200	DrainedArGr	Wye OC|Cereals|900to1200|DrainedArGr	1.74
Wye OC	General	600to700	FreeDrain	Wye OC|General|600to700|FreeDrain	0.04
Wye OC	General	600to700	DrainedAr	Wye OC|General|600to700|DrainedAr	0.26
Wye OC	General	600to700	DrainedArGr	Wye OC|General|600to700|DrainedArGr	0.48
Wye OC	General	700to900	FreeDrain	Wye OC|General|700to900|FreeDrain	0.10
Wye OC	General	700to900	FreeDrain	Wye OC|General|700to900|FreeDrain	0.10
Wye OC	General	700to900	DrainedAr	Wye OC|General|700to900|DrainedAr	0.52
Wye OC	General	700to900	DrainedArGr	Wye OC|General|700to900|DrainedArGr	0.85
Wye OC	General	700to900	DrainedArGr	Wye OC|General|700to900|DrainedArGr	0.85
Wye OC	General	900to1200	FreeDrain	Wye OC|General|900to1200|FreeDrain	0.23
Wye OC	General	900to1200	FreeDrain	Wye OC|General|900to1200|FreeDrain	0.23
Wye OC	General	900to1200	DrainedAr	Wye OC|General|900to1200|DrainedAr	1.04
Wye OC	General	900to1200	DrainedArGr	Wye OC|General|900to1200|DrainedArGr	1.37
Wye OC	General	900to1200	DrainedArGr	Wye OC|General|900to1200|DrainedArGr	1.37
Wye OC	Horticulture	600to700	FreeDrain	Wye OC|Horticulture|600to700|FreeDrain	0.02
Wye OC	Horticulture	600to700	DrainedAr	Wye OC|Horticulture|600to700|DrainedAr	0.14
Wye OC	Horticulture	700to900	FreeDrain	Wye OC|Horticulture|700to900|FreeDrain	0.06
Wye OC	Horticulture	700to900	FreeDrain	Wye OC|Horticulture|700to900|FreeDrain	0.06
Wye OC	Horticulture	700to900	DrainedAr	Wye OC|Horticulture|700to900|DrainedAr	0.28
Wye OC	Horticulture	700to900	DrainedArGr	Wye OC|Horticulture|700to900|DrainedArGr	0.46
Wye OC	Horticulture	700to900	DrainedArGr	Wye OC|Horticulture|700to900|DrainedArGr	0.46
Wye OC	Horticulture	900to1200	FreeDrain	Wye OC|Horticulture|900to1200|FreeDrain	0.13
Wye OC	Horticulture	900to1200	FreeDrain	Wye OC|Horticulture|900to1200|FreeDrain	0.13
Wye OC	Horticulture	900to1200	DrainedAr	Wye OC|Horticulture|900to1200|DrainedAr	0.58
Wye OC	Horticulture	900to1200	DrainedArGr	Wye OC|Horticulture|900to1200|DrainedArGr	0.74
Wye OC	Pig	600to700	DrainedAr	Wye OC|Pig|600to700|DrainedAr	0.33
Wye OC	Pig	700to900	FreeDrain	Wye OC|Pig|700to900|FreeDrain	0.16
Wye OC	Pig	700to900	DrainedAr	Wye OC|Pig|700to900|DrainedAr	0.65
Wye OC	Poultry	700to900	FreeDrain	Wye OC|Poultry|700to900|FreeDrain	0.31
Wye OC	Poultry	700to900	FreeDrain	Wye OC|Poultry|700to900|FreeDrain	0.31
Wye OC	Poultry	700to900	DrainedAr	Wye OC|Poultry|700to900|DrainedAr	0.79
Wye OC	Poultry	700to900	DrainedArGr	Wye OC|Poultry|700to900|DrainedArGr	1.36
Wye OC	Poultry	700to900	DrainedArGr	Wye OC|Poultry|700to900|DrainedArGr	1.33
Wye OC	Poultry	900to1200	FreeDrain	Wye OC|Poultry|900to1200|FreeDrain	0.51
Wye OC	Poultry	900to1200	FreeDrain	Wye OC|Poultry|900to1200|FreeDrain	0.50
Wye OC	Dairy	600to700	FreeDrain	Wye OC|Dairy|600to700|FreeDrain	0.16
Wye OC	Dairy	600to700	DrainedAr	Wye OC|Dairy|600to700|DrainedAr	0.28
Wye OC	Dairy	700to900	FreeDrain	Wye OC|Dairy|700to900|FreeDrain	0.24
Wye OC	Dairy	700to900	FreeDrain	Wye OC|Dairy|700to900|FreeDrain	0.24
Wye OC	Dairy	700to900	DrainedAr	Wye OC|Dairy|700to900|DrainedAr	0.45
Wye OC	Dairy	700to900	DrainedArGr	Wye OC|Dairy|700to900|DrainedArGr	1.60
Wye OC	Dairy	900to1200	FreeDrain	Wye OC|Dairy|900to1200|FreeDrain	0.37
Wye OC	LFA	700to900	FreeDrain	Wye OC|LFA|700to900|FreeDrain	0.13
Wye OC	LFA	700to900	FreeDrain	Wye OC|LFA|700to900|FreeDrain	0.13
Wye OC	LFA	700to900	DrainedAr	Wye OC|LFA|700to900|DrainedAr	0.18
Wye OC	LFA	700to900	DrainedArGr	Wye OC|LFA|700to900|DrainedArGr	0.79
Wye OC	LFA	900to1200	FreeDrain	Wye OC|LFA|900to1200|FreeDrain	0.22
Wye OC	Lowland	600to700	FreeDrain	Wye OC|Lowland|600to700|FreeDrain	0.09
Wye OC	Lowland	600to700	DrainedAr	Wye OC|Lowland|600to700|DrainedAr	0.13
Wye OC	Lowland	600to700	DrainedArGr	Wye OC|Lowland|600to700|DrainedArGr	0.55
Wye OC	Lowland	700to900	FreeDrain	Wye OC|Lowland|700to900|FreeDrain	0.15
Wye OC	Lowland	700to900	FreeDrain	Wye OC|Lowland|700to900|FreeDrain	0.15
Wye OC	Lowland	700to900	DrainedAr	Wye OC|Lowland|700to900|DrainedAr	0.21
Wye OC	Lowland	700to900	DrainedArGr	Wye OC|Lowland|700to900|DrainedArGr	0.88
Wye OC	Lowland	700to900	DrainedArGr	Wye OC|Lowland|700to900|DrainedArGr	0.87
Wye OC	Lowland	900to1200	FreeDrain	Wye OC|Lowland|900to1200|FreeDrain	0.25
Wye OC	Lowland	900to1200	FreeDrain	Wye OC|Lowland|900to1200|FreeDrain	0.24
Wye OC	Lowland	900to1200	DrainedAr	Wye OC|Lowland|900to1200|DrainedAr	0.35
Wye OC	Lowland	900to1200	DrainedAr	Wye OC|Lowland|900to1200|DrainedAr	0.34
Wye OC	Lowland	900to1200	DrainedArGr	Wye OC|Lowland|900to1200|DrainedArGr	1.41
Wye OC	Lowland	900to1200	DrainedArGr	Wye OC|Lowland|900to1200|DrainedArGr	1.39
Wye OC	Mixed	600to700	FreeDrain	Wye OC|Mixed|600to700|FreeDrain	0.06
Wye OC	Mixed	600to700	DrainedAr	Wye OC|Mixed|600to700|DrainedAr	0.24
Wye OC	Mixed	600to700	DrainedArGr	Wye OC|Mixed|600to700|DrainedArGr	0.59
Wye OC	Mixed	700to900	FreeDrain	Wye OC|Mixed|700to900|FreeDrain	0.14
Wye OC	Mixed	700to900	FreeDrain	Wye OC|Mixed|700to900|FreeDrain	0.14
Wye OC	Mixed	700to900	DrainedAr	Wye OC|Mixed|700to900|DrainedAr	0.50
Wye OC	Mixed	700to900	DrainedArGr	Wye OC|Mixed|700to900|DrainedArGr	1.01
Wye OC	Mixed	700to900	DrainedArGr	Wye OC|Mixed|700to900|DrainedArGr	1.01
Wye OC	Mixed	900to1200	FreeDrain	Wye OC|Mixed|900to1200|FreeDrain	0.27
Wye OC	Mixed	900to1200	FreeDrain	Wye OC|Mixed|900to1200|FreeDrain	0.27
Wye OC	Mixed	900to1200	DrainedAr	Wye OC|Mixed|900to1200|DrainedAr	0.27
Wye OC	Mixed	900to1200	DrainedAr	Wye OC|Mixed|900to1200|DrainedAr	0.99
Wye OC	Mixed	900to1200	DrainedArGr	Wye OC|Mixed|900to1200|DrainedArGr	1.63
-	-	-	Greenspace	|||Greenspace	0.02
-	-	-	ommunity food growi	|||Community food growing	0.10
-	-	-	Woodland	|||Woodland	0.02
-	**-**	**-**	**Biddlestone Arable**	**|||Biddlestone Arable**	**0.16**
-	-	-	Water	|||Water	0
-	-	-	Residential urban lan	|||Residential urban land	1.49
-	-	-	ercial/i ndustrial urb	|||Commercial/industrial urban land	1.06
			Biddlestone Polytunn	**|||Biddlestone Polytunnel**	**0.10**
-	-	-	Open urban land	|||Open urban land	0.78