River Camel Phosphate Budget Calculator v1.1.1

Introduction

Following the Dutch Nitrogen Case which ruled that where a site is failing to achieve condition due to pollution, the potential for a new development to add to the nutrient load is "necessarily limited". Special Areas of Conservation (SAC) sites are internationally important areas defined by the National Planning Policy Framework (NPPF) and given special protection under the European Union's Habitats Directive, which was transposed into UK law by the Habitats and Conservation of Species Regulations 2010. This was updated by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. As such, Natural England's view is that any development proposal that adds phosphate into the catchment of internationally important sites, such as the River Camel SAC, is likely to have a significant effect. Proposed developments likely to affect European Sites should be subject to Habitats Regulations Assessment to assess the Likely Significant Affect on the SAC. Application within the Camel catchment will have a Likely Effect and will require an Appropriate Assessment (i.e. the phosphate calculator) to assess the implications of the proposal on the designated site.

This tool is designed to quantify the phosphate loading of an area of land subject to a change of land use and population, in order to identify is proposed developments will be 'Phosphate neutral'. Where the proposed development will create additional phosphate into the system, solutions in how to offset this excess phosphate and achieve phosphate neutrality are presented.

This tool is only necessary for proposed developments that have the potential to increase phosphate loading to rivers that flow into the River Camel SAC. Developments that are located outside of the hydrological catchment but will connect to a Wastewater Treatment Works (WwTW) that drains to a river within the catchment should not complete Stages 2 and 3. This could be the case at locations such as Bodmin, Delabole and St Mabyn. Alternatively, where a site is located within the hydrological catchment but drains to a WwTWs outside of the catchment (i.e. Luxulyan and Wadebridge) then Stage 1 should be set so that the occupancy rate is zero.

The methodology employed within this tool was, in part, guided by Natural England's advice on nutrient neutrality in relation to the Stodmarsh designated sites, published in November 2020.

This tool consists of seven main worksheets:

Stage 1 - Identifies the additional phosphate as a result of changes in the population
Stage 2 - Calculates the phosphate load from current land use
Stage 3 - Calculates the phosphate load from future land uses
Stage 4 - Calculates the total change in phosphate loading as a result of the proposed development
Stage 5 - Calculates the required solutions to achieve phosphate neutrality under current wastewater permit limits
Stage 6 - Calculates the required solutions to achieve phosphate neutrality under AMP7 wastewater permit limits
Stage 7 - Calculates the difference in mitigation solutions between current wastewater permit limits and AMP7 permit limits

About

This Phosphate budget calculator is designed to allow the user to:
- Calculate the phosphate budget for a proposed development, and if, in its current form, the proposed development is phosphate neutral; and
- Assess the various mitigation options if the proposed development is not phosphate neutral.

The tool has been designed so that the user is able to update the data and methods in light of any new research or understanding
The information supplied in this tool is for guidance purposes only and is not intended to provide an exact budget calculation due to the limitations and assumptions of the model. The user is responsible for ensuring the accuracy and completeness of all data entered, be it manually or automatically, and used by this tool. The user is also responsible for any commercial decisions taken on any of the outputs of this tool.
Royal HaskoningDHV will not be liable for any of the following arising from the use of this tool (including from any negligence on the part of Royal HaskoningDHV):
(i) loss of anticipated profits or expected future business;
(ii) damage to reputation or goodwill;
(iii) damages, costs or expenses payable by the user to any third party;
(iv) loss of any order or contract; or
(v) indirect or consequential loss of any kind.

This Phosphate budget calculator has been developed by Royal HaskoningDHV on behalf on Cornwall Council

Phosphate budget calculator, v1.1 (Released October 2021)

General help

The Tool uses the following colour coding to indicate the functionality to the user. These colours are:

The user needs to input a value here
This contains fixed or calculated values and the user does not need to input a value

Stage 1

This stage calculates the change in phosphate loading as a result of changes in the population of a site.

Step 1: The user should input the additional number of units that are proposed by the development. This is then multiplied by the occupancy rate per dwelling.

Step 2: The user has the option to select whether sewage from the proposed development will be handled by Wastewater treatment works or by Package treatment plants. The user must select one or the other, both options cannot be used.

Step 2a: If the proposed development is to use **Wastewater Treatment Works** (**WwTW)**, then the user should select 'Yes' from the drop down box. Following this, the user should select the WwTW that the development will connect to. This will calculate the discharge limit from the selected WwTW, which is assumed to be 90% of the Permit limit. This assumption is on the basis that water companies operate with a sufficient head room of their permit limits.

Step 2b: If the proposed development is to use **Package Treatment Plants (PTPs)**, then the user should select 'Yes' from the drop down box. Following this, the user should input the reduction efficiency of the package treatment plant. If the efficiency is unknown then the user should input a precautionary efficiency of 50%. Higher removal rates can be achieved through PTPs but these will typically require additional phosphate reduction such as chemical dosing that standard PTPs may not include.

Stage 2

This stage calculates the Phosphate load from the current land use. Step 2: The user should input the area (hectares) of the current land uses that make up the total area of the development site. A GIS viewer can be used to identify the land uses on a coarse scale (https://gridreferencefinder.com/). However, if more detail is known about the site land uses then this should be manually inputted by the user.

Stage 3

This stage calculates the phosphate load from the current land use.

Step 2: The user should input the proposed land uses that make up the total area of the development site. Any pre-determined on-site mitigation should also be inputted here.

Bespoke banking coefficients should be inputted for constructed wetland that can be evidenced

Stage 4

This stage provides a summary of the phosphate loads calculated in stages 1-3 and presents the phosphate budget for the proposed development.

A 20% precautionary buffer is included to account for uncertainties in the runoff coefficients used. The User has the option to change this buffer should this be appropriate.

Stage 5

This stage calculates the area and land uses of the mitigation site required for the proposed development to be phosphate neutral, under current WwTW permit limits.

Step 4: The user has the option to select the amount of phosphate load to be offset by the various land uses, which will then calculate the relevant area of land (Hectares) that needs to be changed.

Step 5: The user has the option to input the required area of land (hectares) to be mitigated until the project is phosphate neutral, which will then calculate the equivalent phosphate load for each land use.

The banking coefficients for wetlands uses a value for guidance purposes only. A site bespoke site-specific value will need to be calculated

Stage 6

This stage calculates the area and land uses of the mitigation site required for the proposed development to be phosphate neutral, under AMP7 WwTW permit limits.

Step 4: The user has the option to select the amount of phosphate load to be offset by the various land uses, which will then calculate the relevant area of land (Hectares) that needs to be changed.

Step 5: The user has the option to input the required area of land (hectares) to be mitigated until the project is phosphate neutral, which will then calculate the equivalent phosphate load for each land use.

Stage 7

This stage provides a summary in the differences in mitigation land use area between the current WwTW permit limits and the AMP7 WwTW permit limits

Land Use Definitions

The land uses presented in this tool followed the CORINE 2018 land use data. Definitions of key land uses are presented below:

Land Use	Description
Urban	Development which encompasses the built form, gardens, pathing, roads, hardstanding's, parks and small areas of open space, ponds and SuDS. The phosphate load results from sewer overflows and from drainage that picks up phosphate on the urban land. Agricultural barns used for storage of materials, farming supplies and temporary livestock can be classified as Urban. However, barns used for a specific farming type (e.g. piggeries and chicken farms) should be classified under the relevant farming land use.
Mineral Workings and Quarries	An open or surface mineral working, usually for the extraction of building stone, as slate, limestone, etc.
Allotment and City farms	Wholly or mainly cultivated for the production of vegetable or fruit crops for consumption by the tenant or local community. In some cases the land will also be used for ornamental plants and the keeping of hens or bees.
Sports and Leisure facilities	Facilities used for recreational purposes such as managed sports pitches, athletic fields, gymnasiums, swimming pools etc.
Transport tracks and ways	Encompasses large infrastructure such as motorways and significant rail infrastructure. Small scale roads and tracks are covered under the Urban land use
Transport terminals	A large scale facility where passengers and freight are assembled or dispersed
Dairy	Holdings on which dairy cows account for more than two thirds of their total standard output.
Roots and Combinable	Holdings on which both root crops (e.g. potato, carrot, parsnip, beet, turnip) and combinable crops (crops harvested using a combine harvester) (e.g. Wheat, Barley, Oilseed rape) are the dominant farming type
Mixed Combinable	Holdings on which Winter Wheat, Winter Barley, Spring Barley and Winter Oilseed rape dominate
Winter Combinable	Holdings on which Winter Wheat, Winter Barley and Winter Oilseed rape dominate, with no Spring Barley grown.
Cropping	Holdings on which arable crops (including field scale vegetables) account for more than two thirds of the total standard output, excluding holdings classified as cereals; holdings on which a mixture of arable and horticultural crops account for more than two thirds of their total SO excluding holdings classified as horticulture and holdings on which arable crops account for more than one third of their total standard output and no other grouping accounts for more than one third.
Horticulture	Holdings on which fruit (including vineyards), hardy nursery stock, glasshouse flowers and vegetables, market garden scale vegetables, outdoor blubs and flowers and mushrooms account for more than two thirds of their total standard output.
Pig Farming	Holdings on which pigs account for more than two thirds of their total standard output.
Upland Grazing	Holdings on which cattle, sheep and other grazing livestock account for more than two thirds of their total standard output except holdings classified as diary. A holding is classified as lowland if more than 50% of its total area is in the Less Favoured Area (LFA).
Lowland grazing / Paddock	Holdings on which cattle, sheep and other grazing livestock account for more than two thirds of their total standard output except holdings classified as diary. A holding is classified as lowland if less than 50% of its total area is in the Less Favoured Area (LFA). A paddock is classified as a small enclosures used for grazing horses.
Mixed livestock	Holdings for which none of the other categories account for more than two thirds of total standard output. This category includes mixed pigs and poultry farms as wells as farms with a mixture of crops and livestock (which neither accounts for more than two thirds of standard output.
Poultry farming	Holdings on which poultry account for more than two thirds of their total standard output.
General Arable	Use this option if unsure of the breakdown of arable land.
Improved grass	Land used for grazing (other than arable land) where over one third of the sward comprises, singly or in a mixture, ryegrass, cocksfoot or timothy, or land that has been improved by management practices such as liming and top dressing, where there is not a significant presence of sensitive plants species indicative of native unimproved grassland.
Unimproved grass	Land used for grazing or mowing which is not normally treated with mineral fertiliser or lime and contains a significant presence of sensitive plant species indicative of native unimproved grassland.
Open Space / Greenfield	Greenfield areas that have not been in agricultural use for at least 10 years and are not subject to unmanaged recreational use.
Woodland	Tree-covered areas which either arose naturally or as a result of plantations. This includes conifer woodland, mixed woodlands and broad-leaved woodlands etc.
shrub / heathland / bracken / bog	Land that contains extensive areas of either shrubs, heath or bracken A bog refers to land that is a wetland area of muddy ground that can accumulate peat.
Freshwater marsh	Non-tidal, non-forested marsh wetland that contains fresh water, and is continuously or frequently flooded.
Meadow / semi natural grassland	A meadow is a field habitat vegetated by grass and other non-woody plant that has an open character and is not grazed by livestock
Wetland	Land use specific to constructed wetland only and does not include ponds or SuDS.

Wastewater Permit Limits

Current WwTW permit limits Vs AMP7 WwTW permit limits

The Water industry is looking to update and bring in new final effluent phosphate consent which should come in before 2025, as part of the Water Industry National Environment Programme (WINEP). The enhancements are required to meet more onerous environmental permit requirements. Some WwTW in the catchment already operate at a permit limit. However, following plans by South West Water under AMP7, improvements will be made to Camelford and St Mabyn. Further information regarding AMP7 permit limits can be found below. Where sites do not have a permit limit, a default value of 5mg/l has been applied based on the value applied by the Environment Agency routinely for modelling purposes

Wastewater Treatment Works	Current permit limit (mg/l)	AMP7 permit limit (mg/l)
Camelford	1	0.8
St Breward	5	5
Blisland	5	5
Bodmin - Scarlett's Well	1	1
Bodmin - Nanstallon	1	1
Delabole	1	1
Helstone	5	5
St Teath	5	5
St Mabyn	5	2

Soil Drainage Criteria

The drainage characteristics of soil has a control over the dominant flow pathways for pollutant losses and as such controls the loading of Phosphate into surface water bodies. Therefore the runoff coefficients from various land uses are different in freely draining soil compared to impermeable soil. For impermeable soil under Arable land use, it is assumed that man made drainage systems would be in place, whereas rough grazing and woodland areas would not be drained. For free-draining soil, the majority of the flow would be to groundwater, and it is assumed that drainage would not be required. The user should use the Soilscapes tool (Cranfield soil and Agrifood institute, 2020) to determine the dominant soil type on their site. Soilscapes can be found at http://www.landis.org.uk/soilscapes/index.cfm

The following table is used to identify the dominant drainage type of the proposed development from the soil type identified above. The drainage type should then inform Stage 2 of the calculator

Free draining			Impermeable		
Colour	ID	Name	Colour	ID	Name
	3	Shallow lime-rich soils over chalk or limestone		1	Saltmarsh soils
	4	Sand dune soils		2	Shallow very acid peaty soils over rock
	5	Freely draining lime-rich loamy soils		8	Slightly acid loamy and clayey soils with impeded drainage
	6	Freely draining slightly acid loamy soils		9	Lime-rich loamy and clayey soils with impeded drainage
	7	Freely draining slightly acid but base-rich soils		15	Naturally wet very acid sandy and loamy soils
	10	Freely draining slightly acid sandy soils		16	Very acid loamy upland soils with a wet peaty surface
	11	Freely draining sandy Breckland soils		17	Slowly permeable seasonally wet acid loamy and clayey soils
	12	Freely draining floodplain soils		18	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils
	13	Freely draining acid loamy soils over rock		19	Slowly permeable wet very acid upland soils with a peaty surface
	14	Freely draining very acid sandy and loamy soils		20	Loamy and clayey floodplain soils with naturally high groundwater
				21	Loamy and clayey soils of coastal flats with naturally high groundwater
				22	Loamy soils with naturally high groundwater
				23	Loamy and sandy soils with naturally high groundwater and a peaty surface
				24	Restored soils mostly from quarry and opencast spoil
				25	Blanket bog peat soils
				26	Raised bog peat soils
				27	Fen peat soils

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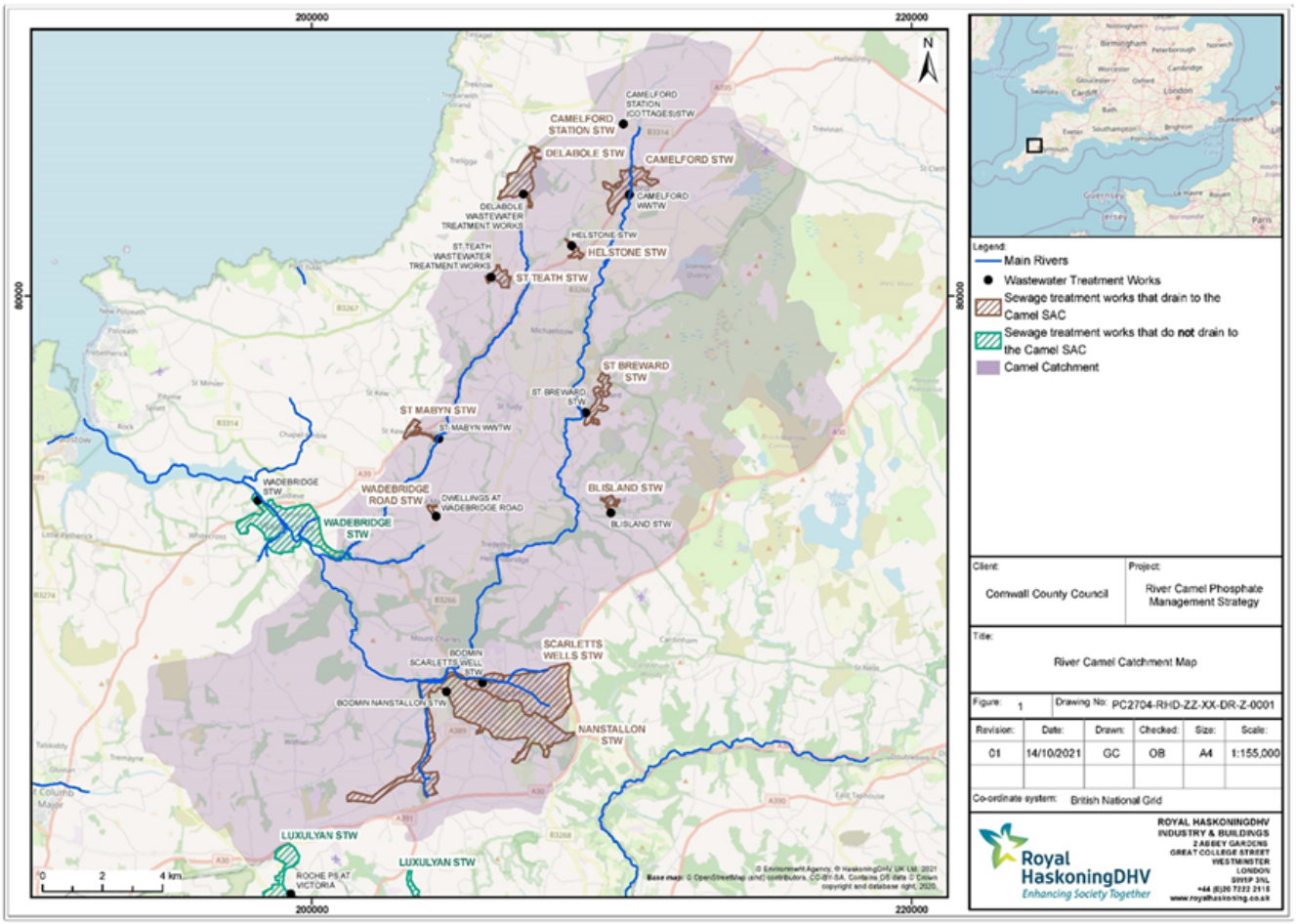
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CAMELFORD STATION STW
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BLISLAND STW
SCARLETTS WELLS STW
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NANSTALLON STW
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ROCHE PS AT VICTORIA
0 2 4 km
Legend:
Main Rivers
Wastewater Treatment Works
Sewage treatment works that drain to the Camel SAC
Sewage treatment works that do not drain to the Camel SAC
Camel Catchment
Client: Cornwall County Council
Project: River Camel Phosphate Management Strategy
Title: River Camel Catchment Map
Figure: 1
Drawing No: PC2704-RHD-ZZ-XX-DR-Z-0001
Revision: 01
Date: 14/10/2021
Drawn: GC
Checked: OB
Size: A4
Scale: 1:155,000
Co-ordinate system: British National Grid
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Planning Application Reference No.	

Site address:	Land West of Little Place, Blisland, Bodmin, Cornwall, PL30 4JF

Site proposal:	Proposed construction of a single dwelling.

Date:	

Additional information:

Stage 1 **Calculate Total Phosphorus (TP) in (Kg/year) derived from the development as a result of increased population**

*Note: This calculation should only include the **additional** units resulting from the proposed development, including any development that will result in overnight accommodation. For land not currently in residential use, this will be the total units proposed by the development. However, for land already in residential use, this should only be the increase in units.*

1. Calculate the additional population	Value	Unit
Number of units as flats, care-home, residential institution proposed		dwellings
Average occupancy	1.65	persons/dwelling
Number of houses proposed	1	dwellings
Average occupancy	2.4	persons/dwelling
Number of **additional** rooms above 6 residents (sui generis) for houses in multiple occupation		dwellings
Average occupancy	1.65	persons/dwelling
Number of rooms in a hotel or guest house proposed		dwellings
Average occupancy	1.65	persons/dwelling
Number of weeks open per year (1-52)		Weeks
Average occupancy rate (1-100)		%
Total population increase generated by the development	**2**	**Persons**

Note: The national average occupancy rate of 2.4 persons per dwelling is used for in this model. The number of proposed units should be evidenced. In the case of hotel and guest house average occupancy rates should also be evidenced. Developments that do not fall within these classifications should contact the Council regarding bespoke calculations.

Please select how the sewage from the proposed development will be handled, noting that a development must be handled by either wastewater treatment plants or package treatment, and cannot be handled by both. Consideration of wastewater loading is not required where a site drains to a wastewater Treatment Works that does not drain in to the River Camel catchment - in this case the occupancy rate should be set to zero.

Is sewage to be handled by wastewater treatment works? Yes

Is sewage to be handled by Package Treatment plants? No

2a. TP budget that would exit the Wastewater Treatment Works (WwTW) after treatment

Note: If the sewage is to be treated by wastewater treatment plants then the user should select "Yes" in the list above. If package treatment plants are to be used instead, then the user should select "No" above.

This is the process of collecting wastewater from houses and guiding it, via the sewage network, to WwTW (also known as sewage works). The Phosphate concentration of the influent is calculated by multiplying the number of people by the expected water usage per day. The Phosphate concentration within the effluent is calculated by applying the discharge level of the appropriate WwTW. The Phosphate loading is expressed in kg/year.

Calculate the wastewater volume generated	Value	Unit
Total population increase generated by the development	2	Persons
Water use per person	110	Litres/person/day
Wastewater volume generated by the development	**264**	**Litres/day**

Confirm receiving WwTW and discharge level	Value	Unit

2b. TP budget for Package Treatment Plants (PTPs)

Note: If the sewage is to be treated by package treatment plants then the user should select "Yes" in the list above. If wastewater treatment plants are to be used instead, then the user should select "No" above.

Packaged wastewater treatment plants are pre-manufactured treatment facilities used to treat wastewater in smaller communities or on individual properties. This concept is defined as decentralized wastewater treatment. The Phosphorous influent is calculated by multiplying the number of people by the expected loading per person. The Phosphate effluent is calculated by applying the PTP reduction efficiency. The Phosphate loading is expressed in kg/year.

Calculate TP load prior to treatment	Value	Unit
Total population increase generated by the development	0	Persons
Average Phosphate loading per person	0.99	Kg/person/year
Total Phosphorus prior to treatment	**0.00**	**Kg/year**

Calculate TP load after treatment	Value	Unit

Select the WwTW the development will connect to	Blisland	
WwTW discharge level	**5.00**	**mg/L**

Note: Please use the drop down lists to select the WwTW that the proposed development will be connected to. If the WwTW is not known, then please select 'Unknown' from the drop down list.

Calculate the TP discharged by the WwTW	Value	Unit
TP discharged by WwTW	1320	mg/day
TP discharged by WwTW	0.0013	Kg/day
Phosphate loading from WwTW	**0.48**	**Kg/year**

Receiving PTP reduction efficiency	0	%
Total Phosphorus discharge after PTP treatment	0.00	Kg/year

Note: The user must input the reduction efficiency of the PTP. The efficiency of the PTP used must be evidenced. The evidence should include the test result documents from the lab (in English) and/ or measured effluent concentrations from real world applications. If the efficiency is unknown then a precautionary value of 50% can be used.

Calculate TP load from development wastewater with on-site PTP	Value	Unit
PTP Total Phosphorus load	**0.00**	**Kg/year**

3.	Calculate the additional population TP load	Value	Unit
	Total Phosphorus load from additional population	**0.48**	**Kg/year**

Stage 2 **Calculate existing (pre-development) TP from current land use of the development**

Note: Where development sites include existing areas that are to be retained, these areas can be excluded from the calculations in both Stages 2 and 3.

1.	Total area of development site	Value	Unit
	Total area of the development site	**0.050**	**Hectares**

2.	Identify current land uses of the development site	Value	Unit
	Identify the drainage type of the soil on site		
	Is the soil type free draining?	Yes	

Note: Identify the soil drainage type from the Viewer, and use the criteria table in the Help tab to identify if the soil is either permeable or impermeable

			Drainage system installed on managed grassland fields?
Urban development	0.050	Hectares	
Mineral workings and quarries		Hectares	
Open space / Greenfield		Hectares	
Allotments and city farms		Hectares	
Sports and leisure facilities		Hectares	
Transport tracks and ways		Hectares	
Transport terminals		Hectares	
Dairy		Hectares	No
Lowland grazing		Hectares	No
Upland grazing		Hectares	No
Mixed Livestock		Hectares	No
Outdoor pig		Hectares	No
Roots and Combinable		Hectares	No
Mixed combinable		Hectares	No
Winter combinable		Hectares	No
Horticulture		Hectares	No
Poultry		Hectares	No
Indoor pig		Hectares	No
General Arable		Hectares	No
Improved grass		Hectares	
Unimproved grass		Hectares	
Woodland (e.g. conifer, mixed, broad-leaved)		Hectares	
shrub / heathland / bracken / bog		Hectares	
freshwater marsh		Hectares	
Meadow / semi natural grassland		Hectares	
Sum total of land uses	**0.050**	**Hectares**	

Note: The sum total of land uses must equal the development site area - the box will colour red if the areas do not match.

3.	Calculate TP from current land usage	Value	Unit
	TP load from current land usage	**0.04**	**Kg/year**

Stage 3 **Calculate TP for the proposed development**

Note: This section should include all land uses within the proposed development. Where the proposed scheme is to create new wetlands, woodlands, nature reserves, etc. within the development site area, then this should be included within this section. Any offsite mitigation should not be included below, and should instead be inputted in Stage 5 (if mitigation is required).

1.	Total area of development site	Value	Unit
	Total area of the development site	**0.050**	**Hectares**

2.	Identify proposed land uses of the development site	Value	Unit
	Urban development	0.050	Hectares
	Open Space / Greenfield		Hectares
	Woodland		Hectares
	Nature reserve		Hectares
	Heathland / Bog		Hectares
	Allotment		Hectares
	Meadow/semi-natural grassland		Hectares
	Sports and Leisure facilities		Hectares

Note: The sum total of land uses must equal the development site area inputted in stage 1 - the box will colour red if the areas do not match. Wetland refers to specific wetland off a watercourse - for more information refer to the land use definitions in the help tab.

3.	Designed Wetlands / SuDS		
	Wetland / SuDS area		Hectares
	Banking coefficient		Kg/ha/year

Note: Please input the banking coefficient calculated for the designed wetland / SuDS. The calculated value should be justifiable.

	Sum total of land uses	**0.050**	**Hectares**

4.	Calculate TP from proposed land usage	Value	Unit
	TP load from proposed land usage	**0.04**	**Kg/year**

5.	Calculation of gross P loading	Value	Unit
	Gross TP load from current and proposed land usage	**0.48**	**Kg/year**

Note: this step is for illustrative purposes when iteratively creating mitigation land on-site

Stage 4 **Calculate the net change in Phosphorus load from the proposed development**

Note: This stage calculates the net change in total phosphorus load to the catchment from the proposed development. This is derived by calculating the difference between the total phosphorus load calculated for the proposed development (wastewater, urban area, open space etc.) and that for the existing land uses. The phosphate budget for the site has been calculated under current and AMP7 WwTW permit levels.

		Current	AMP7		Summary	
					No. of dwellings	1
1.	Identify the Phosphate load from additional population	Value	Value	Unit	WwTW location	Blisland
					Current discharge lim	5
	Phosphate loading from additional population	**0.48**	**0.48**	**Kg/year**	AMP7 discharge limit	5
2.	Calculate net change in Phosphate load from land use change	Value	Value	Unit	TP current land use	0.04
	Phosphate load from land use change	**0.00**	**0.00**	**Kg/year**	TP proposed land use	0.04
3.	Calculate phosphate budget for the development site	Value	Value	Unit		
	Phosphate budget for the site	**0.48**	**0.48**	**Kg/year**		
4.	Calculate phosphate budget precautionary buffer	Value	Value	Unit		
	Buffer amount	20	20	%		
	Precautionary buffer	**0.10**	**0.10**	**Kg/year**		

Note: The figures used throughout this model are based on scientific research, evidence and modelled catchments and represent the best available evidence. However, it is important that a precautionary buffer is used that recognises the uncertainty with these figures and ensures, with reasonable certainty, that there will be no adverse effect on site integrity. As such, a 20% precautionary buffer is built into the calculation.

5.	**Total phosphorus budget for the development site**	Value	Value	Unit		
	Total Phosphorus budget for the site	**0.58**	**0.58**	**Kg/year**		

Current WwTW Permit levels

Development will generate additional Phosphate (Mitigation required) - Please progress to Stage 5

AMP7 WwTW Permit levels

Development will generate additional Phosphate (Mitigation required) - Please progress to Stage 6

Stage 5 **Calculate the current TP banking for the proposed development**

Note: This section is only required for projects that will generate additional phosphate and as a result need to implement mitigation measures, in order to achieve phosphate neutrality under the current WwTW permit limits.

1.	Total Phosphorus budget for the development site	Value	Unit
	Total phosphorus budget to be mitigated	**0.58**	**Kg/year**

2. Identify current land use of mitigation area

2a. On-site mitigation [Ye:]

2b. Off-site mitigation [ ]

Note: If the mitigation is to be implemented on-site then the user should select "Yes" in the list above. If off-site mitigation is to be implemented instead, then the user should select "No" above.

Note: If the mitigation is to be implemented off-site then the user should select "Yes" in the list above. If on-site mitigation is to be implemented instead, then the user should select "No" above.

Identify current land use on-site mitigation area	Value		Unit
Average land use of the on-site mitigation area	**0.83**	No	**Kg/ha/year**

Identify current land use of off-site mitigation area

Identify the drainage type of the soil on the mitigation site

Is the soil type free draining? [ ]

Note: Identify the soil drainage type from the Viewer, and use the criteria table in the Help tab to identify if the soil is either permeable or impermeable

Specific land use of on-site mitigation area				**Specific land use of off-site mitigation area**	Drainage system installed on managed grassland fields?
Urban development	**0.83**	No	Kg/ha/year	Urban development	
Mineral workings and quarries		No	Kg/ha/year	Mineral workings and quarries	
Open space / Greenfield		No	Kg/ha/year	Open space / Greenfield	
Allotments and city farms		No	Kg/ha/year	Allotments and city farms	
Sports and leisure facilities		No	Kg/ha/year	Sports and leisure facilities	
Transport tracks and ways		No	Kg/ha/year	Transport tracks and ways	
Transport terminals		No	Kg/ha/year	Transport terminals	
Dairy		No	Kg/ha/year	Dairy	No
Lowland grazing		No	Kg/ha/year	Lowland grazing	No
Upland grazing		No	Kg/ha/year	Upland grazing	No
Mixed Livestock		No	Kg/ha/year	Mixed Livestock	No
Outdoor pig		No	Kg/ha/year	Outdoor pig	No
Roots and Combinable		No	Kg/ha/year	Roots and Combinable	No
Mixed combinable		No	Kg/ha/year	Mixed combinable	No
Winter combinable		No	Kg/ha/year	Winter combinable	No
Horticulture		No	Kg/ha/year	Horticulture	No
Poultry		No	Kg/ha/year	Poultry	No
Indoor pig		No	Kg/ha/year	Indoor pig	No
General Arable		No	Kg/ha/year	General Arable	No
Improved grass		No	Kg/ha/year	Improved grass	
Unimproved grass		No	Kg/ha/year	Unimproved grass	
Woodland (e.g. conifer, mixed, broad-leaved)		No	Kg/ha/year	Woodland (e.g. conifer, mixed, broad-leaved)	
shrub / heathland / bracken / bog		No	Kg/ha/year	shrub / heathland / bracken / bog	
freshwater marsh		No	Kg/ha/year	freshwater marsh	
Meadow / semi natural grassland		No	Kg/ha/year	Meadow / semi natural grassland	

grassland

On-site mitigation land runoff coefficient	**NaN**	**Off-site mitigation land runoff coefficient**	**0.00**

mitigation land runoff coefficient

3. Identify proposed land uses for mitigation	Value	Unit
Constructed wetland	0.072	Hectares
Open Space / Greenfield	-4.130	Hectares
Nature reserve	-28.908	Hectares
Woodland	-28.908	Hectares
Heathland / Bog	-28.908	Hectares
Meadow/semi-natural grassland	-2.891	Hectares

Designed Wetland banking coefficient

Banking coefficient		Kg/ha/year

Note: This section calculates the required area (hectares) needed for each land use type to individually mitigate the total excess phosphate. This is included to provide context for the user when inputting required mitigation land uses in either section 4 and 5. Constructed wetland uses a generic runoff coefficient for guidance purposes only. Site-specific values will differ and should be manually inputted above.

4. Identify proposed land uses for mitigation	Value	Unit	Value	Unit
Constructed wetland		kg/year	0	Hectares
Open Space / Greenfield	0.01	kg/year	-0.071	Hectares
Nature reserve		kg/year	0	Hectares
Woodland		kg/year	0	Hectares
Heathland / Bog		kg/year	0	Hectares
Meadow/semi-natural grassland		kg/year	0	Hectares
Sum total area needed to be created	**0.57**	**Kg/year**	**-0.071**	**Hectares**

Note: This section allows the user to input the required total phosphate to be offset for the various land uses, with the equivalent area that would be required to be created. If the mitigation is to be implemented on-site then the actual area of mitigation land may differ from the value quoted due to the relative reduction in other land uses on-site. Therefore, for on-site mitigation these areas should be used a guide and but back into Stage 3 iteratively until the project is Phosphate neutral.

5. Identify proposed land uses for mitigation	Value	Unit	Value	Unit
Constructed wetland		hectares	0.00	kg/year
Open Space / Greenfield		hectares	0.00	kg/year
Nature reserve		hectares	0.00	kg/year
Woodland		hectares	0.00	kg/year
Heathland / Bog		hectares	0.00	kg/year
Meadow/semi-natural grassland	0.039	hectares	-0.01	kg/year
Sum total area needed to be created	**0.039**	**hectares**	**0.59**	**Kg/year**

Note: This section allows the user to input the required area for the various land uses to be created, with the equivalent total phosphate to be offset in order for the development to be phosphate neutral. The same applies as above regarding on-site mitigation.

Stage 5 **Calculate the current TP banking for the proposed development**

Note: This section is only required for projects that will generate additional phosphate and as a result need to implement mitigation measures, in order to achieve phosphate neutrality under the AMP7 WwTW permit limits.

1.	Total Phosphorus budget for the development site	Value	Unit
	Total phosphorus budget to be mitigated	**0.58**	**Kg/year**

2. Identify current land use of mitigation area

2a. On-site mitigation [Nc]

2b. Off-site mitigation [ ]

Note: If the mitigation is to be implemented on-site then the user should select "Yes" in the list above. If off-site mitigation is to be implemented instead, then the user should select "No" above.

Note: If the mitigation is to be implemented off-site then the user should select "Yes" in the list above. If on-site mitigation is to be implemented instead, then the user should select "No" above.

Identify current land use on-site mitigation area	Value		Unit
Average land use of the on-site mitigation area	**0.83**	No	**Kg/ha/year**

Identify current land use of off-site mitigation area

Identify the drainage type of the soil on the mitigation site

Is the soil type free draining? [ ]

Note: Identify the soil drainage type from the Viewer, and use the criteria table in the Help tab to identify if the soil is either permeable or impermeable

Specific land use of on-site mitigation area				**Specific land use of off-site mitigation area**	Drainage system installed on managed grassland fields?
Urban development	**0.83**	No	Kg/ha/year	Urban development	
Mineral workings and quarries		No	Kg/ha/year	Mineral workings and quarries	
Open space / Greenfield		No	Kg/ha/year	Open space / Greenfield	
Allotments and city farms		No	Kg/ha/year	Allotments and city farms	
Sports and leisure facilities		No	Kg/ha/year	Sports and leisure facilities	
Transport tracks and ways		No	Kg/ha/year	Transport tracks and ways	
Transport terminals		No	Kg/ha/year	Transport terminals	
Dairy		No	Kg/ha/year	Dairy	No
Lowland grazing		No	Kg/ha/year	Lowland grazing	No
Upland grazing		No	Kg/ha/year	Upland grazing	No
Mixed Livestock		No	Kg/ha/year	Mixed Livestock	No
Outdoor pig		No	Kg/ha/year	Outdoor pig	No
Roots and Combinable		No	Kg/ha/year	Roots and Combinable	No
Mixed combinable		No	Kg/ha/year	Mixed combinable	No
Winter combinable		No	Kg/ha/year	Winter combinable	No
Horticulture		No	Kg/ha/year	Horticulture	No
Poultry		No	Kg/ha/year	Poultry	No
Indoor pig		No	Kg/ha/year	Indoor pig	No
General Arable		No	Kg/ha/year	General Arable	No
Improved grass		No	Kg/ha/year	Improved grass	
Unimproved grass		No	Kg/ha/year	Unimproved grass	
Woodland (e.g. conifer, mixed, broad-leaved)		No	Kg/ha/year	Woodland (e.g. conifer, mixed, broad-leaved)	
shrub / heathland / bracken / bog		No	Kg/ha/year	shrub / heathland / bracken / bog	
freshwater marsh		No	Kg/ha/year	freshwater marsh	
Meadow / semi natural grassland		No	Kg/ha/year	Meadow / semi natural grassland	

grassland

On-site mitigation land runoff coefficient	**0.00**	**Off-site mitigation land runoff coefficient**	**0.00**

mitigation land runoff coefficient

3. Identify proposed land uses for mitigation	Value	Unit
Constructed wetland	NaN	Hectares
Open Space / Greenfield	-4.130	Hectares
Nature reserve	-28.908	Hectares
Woodland	-28.908	Hectares
Heathland / Bog	-28.908	Hectares
Meadow/semi-natural grassland	-2.891	Hectares

Designed Wetland banking coefficient

Banking coefficient		Kg/ha/year

Note: This section calculates the required area (hectares) needed for each land use type to individually mitigate the total excess phosphate. This is included to provide context for the user when inputting required mitigation land uses in either section 4 and 5. Constructed wetland uses a generic runoff coefficient for guidance purposes only. Site-specific values will differ and should be manually inputted above.

4. Identify proposed land uses for mitigation	Value	Unit	Value	Unit
Constructed wetland		kg/year	0	Hectares
Open Space / Greenfield		kg/year	0	Hectares
Nature reserve		kg/year	0	Hectares
Woodland		kg/year	0	Hectares
Heathland / Bog		kg/year	0	Hectares
Meadow/semi-natural grassland		kg/year	0	Hectares
Sum total area needed to be created	**0.58**	**Kg/year**	**0.000**	**Hectares**

Note: This section allows the user to input the required total phosphate to be offset for the various land uses, with the equivalent area that would be required to be created. If the mitigation is to be implemented on-site then the actual area of mitigation land may differ from the value quoted due to the relative reduction in other land uses on-site. Therefore, for on-site mitigation these areas should be used a guide and but back into Stage 3 iteratively until the project is Phosphate neutral.

5. Identify proposed land uses for mitigation	Value	Unit	Value	Unit
Constructed wetland		hectares	0.00	kg/year
Open Space / Greenfield		hectares	0.00	kg/year
Nature reserve		hectares	0.00	kg/year
Woodland		hectares	0.00	kg/year
Heathland / Bog		hectares	0.00	kg/year
Meadow/semi-natural grassland	0.390	hectares	-0.08	kg/year
Sum total area needed to be created	**0.390**	**hectares**	**0.66**	**Kg/year**

Note: This section allows the user to input the required area for the various land uses to be created, with the equivalent total phosphate to be offset in order for the development to be phosphate neutral. The same applies as above regarding on-site mitigation.

Stage 7 Difference in mitigation land uses between current WwTW permit limits and AMP7 WwTW permit limits

1. Total Area of proposed mitigation land uses	Current WwTW	AMP7 WwTW	Difference	
	Value	Value	Value	Units
Constructed wetland	0.000	0.000	0.000	Hectares
Open Space / Greenfield	-0.071	0.000	0.071	Hectares
Nature reserve	0.000	0.000	0.000	Hectares
Woodland	0.000	0.000	0.000	Hectares
Heathland / Bog	0.000	0.000	0.000	Hectares
Meadow/semi-natural grassland	0.039	0.390	0.351	Hectares
Sum total area needed to be created	**-0.032**	**0.390**	**0.422**	**Hectares**

Note: This section demonstrates to the user the amount of mitigation land that is no longer required for the project to be 'Phosphate Neutral' following implementation of the AMP7