Land Adjacent
Harvest Lane
Charlton Horethorne
Somerset

51.010243 -2.483002

Phosphate Neutrality Assessment

S23-884/PNA
August 2023

Revision 2

Prepared by :

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On behalf of :

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APPENDICES

1.0 Introduction

Southwest Environmental Limited have been commissioned by Hopkins Developments Limited to produce a Phosphate Neutrality Assessment for the proposed development at Land Adjacent Harvest Lane.

2.0 The Site

The site comprises an area of land forming an agricultural field enclosure. Length is approx. 280 in long axis. The land slopes from west to east. Fall is from 145mAOD to 130mAOD, equating to approximately 15m. Fall is around 20 meters from north to south, this equates to a gradient of c. 5%. The proposal would see 2no. 1 bedroom flats and, 2no. 2 bedroom flats (modelled as dwellings) and 27no. Residential dwellings, illustrative master plan indicates significant green infrastructure areas, with strategic tree planting at various points within the site.

3.0 Background

Recent CJEU Dutch Nitrogen case law relating to impacts of nutrient laden water impacting on sensitive ecological sites, has highlighted a requirement to mitigate against effluent out flows from proposed developments.

The application site falls within the catchment flowing into the Somerset Levels and Moors RAMSAR, designated for its rare aquatic invertebrates. There is a major issue with nutrients entering watercourses which adversely changes environmental conditions for these species.

Any new housing, including single dwellings, will result in an increase in phosphates contained within water discharge. As the designated site is in ‘unfavourable’ condition any increase, including from single dwellings, is seen as significant, either alone or in combination with other developments.

Whilst this report is not a Habitats Regulation Assessment, it would be the principal piece of information used to guide the outcome of a Habitats Regulations Assessment. A Habitats Regulation Assessment would screen for affected sites of high importance, which might be influenced by the project.

In this instance we are dealing with cumulative impacts, as the individual impact from this project would be unmeasurable at the receptor location, which is approximately 15 miles downstream of proposal.

The receptor has been identified as Somerset Levels and Moors RAMSAR, the substance of concern is Phosphate. A mitigative response to phosphates arising from the proposed development is suggested within this report.

Most aquatic systems are naturally low in biologically available P. So, when P availability increases, aquatic plants tend to grow rapidly and cause degradation of water quality (e.g. algal blooms).

4.0 Scope

In order to complete a Habitats Regulations Assessment Natural England require a calculated response for mitigation i.e. information on how additional P. from foul water is to be dealt with.

> *"Natural England advise that mitigation will need to be identified and secured by the applicant in order to complete the* [NE's] *Habitats Regulations Assessment."*

In previous correspondence further advice has been given regards to mitigation:

> *"Alternatively an applicant may source their own mitigation. For Package Treatment Plant this can be a small wetland, specifically designed to remove phosphates, its area depending on the amount of phosphate kilograms produced form the proposed development per year."*

5.0 Impact Assessment

The potential impacts from the project are now reviewed based on the Source, Pathway, Receptor Model.

5.1 Source

There are numerous sources of phosphate that contribute to phosphorous found in domestic waste water[1].

Table 5 Source apportionment of P in raw domestic waste water (Defra 2008)

Source	Contribution
Faeces	23%
Urine	41%
Food waste	5%
Mains supply (phosphate added to reduce lead in drinking water)	5%
Toothpaste	1%
Dishwasher detergent	7%
Laundry detergent	18%

In February 2021 Somerset and West Taunton released their Phosphate Budget Calculator Version 3.1[2], which indicates a budget of 0.99kg/phosphate/year per person. This calculator is now used across Somerset Unitary Authority.

[1] https://www.sepa.org.uk/media/163158/crew_septic_tanks.pdf

The Phosphate Budget Calculator accounts for Flats, Houses and Guest Houses. For other types of development it is assumed consultants are intended to make their own calculations.

It is proposed to use an Iron Dosing Klargester Adopted by Albion Water at 95% efficient (0.3mg/l). This is the source we have considered in the budget calculation.

5.2 Pathway

The pathway from site, to receptor is via lateral drain, to the onsite treatment system as described below. Effluent from the system then flows in to ground water. This surface water then supports seasonal flow of tributaries of ultimate the River Parrett flowing towards the Somerset Levels, where the receptors arelocated.

5.3 Receptor

The receptor of principal concern is Somerset Levels and Moors. Within this area various locations are of national and internationally significance for wildlife. Thus the Somerset Levels and Moors are designated as a Special Protection Area (SPA) under the Habitat Regulations 2017 and listed as a RAMSAR Site under the RAMSAR Convention.

Natural England have advised re. the high levels of phosphates in the Somerset Levels and Moors.

In light of a court Judgement (known as Dutch N), Natural England have advised District and County Councils that, in light of the unfavorable condition of the Somerset Levels and Moors RAMSAR Site, before determining a planning application that may give rise to additional phosphates within the catchment, competent authorities should undertake a Habitats Regulations Assessment (HRA).

6.0 Mitigation

In order for the development to demonstrate neutrality, accounting for the increase in on site population. If the development can be shown to produce no more than existing loading, then it will be phosphate neutral.

We propose an adequately sized package treatment plant with iron dosing. This will be adopted by Albion Water. With suitable credit scheme to mitigate against positive budget. Details are included in subsequent chapters.

We have included details of the package treatment plant **Appendix 3**. Performance monitoring and end of life considerations are included in **Appendix 4**.

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[2] https://ssccust1.spreadsheethosting.com/1/3d/08e177701b0026/Copy%20of%20P%20budget%20Calc_V3.0%20developer%20version%2026.02.2021/Copy%20of%20P%20budget%20Calc_V3.0%20developer%20version%2026.02.2021.htm

6.1 Package Treatment Plant

The package treatment plant is primarily to remove suspended solids, and to provide primary treatment prior to the secondary treatment stage in the filter media. We have not included treatment efficacy for the package treatment plant, as the phosphate removal as calculated to come solely from the filter media as per 6.2. The following models would be acceptable, based on notional occupancy:

- Kingspan BioDic +P

The PTP will require regular desludging, maintenance, monitoring and replenishment of dosing chemicals. These and other measures to ensure scheme runs in perpetuity will be ensure by Albion Water.

6.2 Land Use

There will be an amount of mitigation provided from on-site land use changes including removal of agricultural use, and provision of SUDs areas, open space and woodland. These land use changes are reflected in Phosphate Budget Calculator.

6.2.1 Banking

With regards to wetlands: Studies show a wide variance in removal rates of Phosphates, ranging from 1 to 41 kg/ha/yr. We have observed the flowing references in scientific literature:

- 7.4 kg/ha/yr Reddy & DeBusk, 1987
- 41 kg/ha/yr Karin Johannesson 2008
- 2.6 kg/ha/yr Johnston 1991

We have also made a literature review, and present above banking coefficients. The average value of the above studies is 17 kg/ha/yr, we have added a 100% buffer to this and round down giving banking value of 8kg/ha/year.

6.4 Credits

The remaining balance of **4.30 kg** will be off-set with credits from septic tank upgrades. 7 Septic tanks within the applicant's control will be upgraded, and this should supply the amount of credits required.

7.0 Adopted Drainage Justification

The plan on site is to install a package treatment plant (as specified above) that will then be adopted by Albion Water. This will avoid having connect to "true mains" infrastructure, with all of the associated problems:

Many of the sewerage undertakers such as Southwest Water or Wessex Water are management Sewage Treatment Assets that are decades past their serviceable life span. Not only in terms of the technology they employ, but there capacity, which was designed for 1970's population levels. There are now 17,000,000 million more people living in the UK. More importantly impermeable surfaces drained to foul sewer have also increased.

The majority of Sewage Treatment Works in the UK operate Combined Sewer Overflows (CSOs). This was originally designed to divert very heavy flows around the treatment system, in the case of very heavy rainfall. It is worth noting that Charlton Horethorn STW operated its combined Sewer Overflow for 80[3] hours during 2022.

	Raw Sewage Discharged from Site to River
Existing	1 %
Proposed	0 %

Increases in rainfall intensity owing to climate change, and increases in paved areas, coupled with little or no expansion in capacity at Sewage Treatment Works leads to the frequent, and in some case near constant discharge (250 days a year[4]) of raw untreated sewage in to Rivers and Seas. This not only side steps discharge consent limits for phosphates but results in raw sewage with it associated BOD, COD, Coliform Load, entering Rivers and Sea. In addition to this we are now learning about the impact of plastics contained in sewage on Fluvial and Marine ecosystems.

A great many plastics contain Phthalates which are a softening agent commonly used in many flexible plastics. They are an endocrine disruptor and are causing fertility problems in a wide range of Marine and Fluvial organisms. Phalates are environmentally persistent chemicals much like DDT and PCBs. They concentrate up the food chain causing sterility and deformity in higher predators, including humans[5].

During operation of a Combined Sewer Overflow, all Marco plastics contained in sewage are released to Rivers and Sea: Dental Floss, Condoms, Cotton Buds, Plastic Wrappings, Wet Wipes, Sanitary Towels, Tampons and Tampon Applicators. All end up in the river tangled around low braches or washed up on beaches. Where they degrade in to trillions of micro and Nano plastic particles.

The correct way in which to dispose of the sludge, collected from the treatment plant, filter vessel and reed bed aggregate (in decreasing order of sludge concentration) is an important point. We would recommend that the tankered waste is disposed of at a dewatering plant, where all sludge is recovered, and disposed to landfill.

[3] https://corporate.wessexwater.co.uk/our-purpose/rivers-and-coastal-waters/storm-overflows
[4] https://papp.charity/2022/03/10/welsh-water-sewage-in-rivers/
[5] https://www.reuters.com/article/us-genital-idUSTRE7230RO20110304

We would therefore recommend that the enforcers involved in the determination support this application for installation of an adoptable PTP.

8.0 Conclusions

The proposal as described above would result in a Phosphate Neutral Development.

9.0 Limitations

For the avoidance of doubt, the parties hereby expressly agree that the Consultant takes no liability for and gives not warranty against actual flood, sewage, nutrient or water damage of The Client's property, or natural environment in relation to the performance of the service.

This report gives estimates of likely flows and occupancy number, but does not accept liability associated for the use of these figures in the construction of sewers or drains. Options appraisals are given as example only. Responsibility for design / services and resulting levels of performance rests with the client and or developer.

This is a planning report and should not be used in any attempt to prescribe value to assets, or to cost for future works. The specifications herein are for guidance only, and no responsibility will be taken for their efficacy or issues surround practical implementation.

This report is produced for the sole use of the Client, and no responsibility of any kind, whether for negligence or otherwise, can be accepted for any Third Party who may rely upon it.

The conclusions and recommendations given in this report are based on our understanding of the future plans for the site.

The scope of this report was discussed and agreed with the Client. No responsibility is accepted for conditions not encountered, which are outside of the agreed scope of work.

APPENDIX 1

Plans

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

PLEASE REFER TO THE HEALTH AND SAFETY FILE FOR A FULL LIST OF THE HAZARDS ASSOCIATED WITH THIS WORK - THE FOLLOWING ARE THE MOST SIGNIFICANT ITEMS TO BE AWARE OF.

CONSTRUCTION

1. OPERATIVES TO TAKE PRECAUTIONS WHEN WORKING ADJACENT TO OR WITHIN DEEP EXCAVATIONS. METHOD STATEMENT TO BE PRODUCED BY CONTRACTOR PRIOR TO WORKS COMMENCING.
2. ATTENTION IS DRAWN TO THE EXISTENCE OF BOTH EXISTING UNDERGROUND AND OVERHEAD UTILITIES.

ENVIRONMENTAL

1. EXISTING WATERCOURSES IN CLOSE PROXIMITY TO WORKS. A POLLUTION PREVENTION STRATEGY AND WORKING METHOD STATEMENTS TO BE PRODUCED BY THE CONTRACTOR FOR ALL WORKS.
2. CONSIDERATION GIVEN TO NOISE LEVELS GIVEN PROXIMITY TO EXISTING PROPERTIES.
3. CONSIDERATION GIVEN TO GROUND CONDITIONS. CONTRACTOR TO REVIEW GEOTECHNICAL REPORT PRIOR TO UNDERTAKEN EXCAVATION WORKS.

WORK CAN ONLY BE CARRIED OUT BY SUITABLY TRAINED AND BRIEFED PERSONNEL.

AWAITING TECHNICAL APPROVAL

This drawing has NOT been technically approved by Local Authority and/or Water Authority. All works subject to change through technical review process with relevant approving authorities.

Key:

- Section 38 Agreement boundary
- Filter drain
- Surface water sewer and associated manhole
- Soakaway boundary (5.0m from buildings)
- Private house soakaway
- Foul water sewer and associated manhole
- Existing foul water sewer
- Overland flood route

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL DRAWINGS WITHIN APPENDIX 0/4. THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS (SHW) AND THE CONTRACT SPECIFICATION.
2. HIGHWAY WORKS WHERE INDICATED BEYOND THE PROPOSED ADOPTION BOUNDARY ARE TO BE CONSTRUCTED AS PART OF THIS CONTRACT BUT TO REMAIN PRIVATE.
3. FOR APPLICABLE SECTOR SCHEMES FOR WORKMANSHIP AND MATERIALS WITH ASSOCIATED APPENDICES; REFER TO APP 1/24 QUALITY MANAGEMENT SYSTEM PART E.
4. IN ACCORDANCE WITH THE CDM REGULATIONS RESIDUAL RISKS OF SIGNIFICANCE ARE INDICATED ON THE DRAWING ONLY BY MEANS OF A HAZARD TRIANGLE WITH APPROPRIATE NOTE.
5. THE CONTRACTOR SHALL CONDUCT THE WORKS WITH DUE REGARD TO THE ECOLOGICAL AND ENVIRONMENTAL REQUIREMENTS OF THE SCHEME.
6. THE CONTRACTOR SHALL TAKE SUCH STEPS TO SAFEGUARD AGAINST CONTAMINATION OF LOCAL WATERCOURSES.
7. TEMPORARY WORKS DESIGN ASSOCIATED WITH THE CONSTRUCTION OF THE WORKS SHALL BE RESPONSIBILITY OF THE CONTRACTOR.
8. VECTOS CANNOT ACCEPT ANY LIABILITY FOR UTILITY RECORDS. PRIOR TO CONSTRUCTION THE CONTRACTOR IS TO VERIFY THE STATUS, LOCATION AND ALIGNMENT OF APPARATUS.
9. PRIOR TO THE CONSTRUCTION OF THE DRAINAGE WORKS, THE CONTRACTOR SHALL SET OUT THE PROPOSED LOCATION OF THE DRAINAGE SYSTEM AND ANY LIGHTING, SIGNAGE AND SERVICES. IN THE EVENT OF CONFLICTS THE CONTRACTOR SHALL IMMEDIATELY INFORM THE SUPERVISOR AND AWAIT INSTRUCTIONS ON HOW TO PROCEED.
10. THE CONTRACTOR SHALL CONFIRM THAT ALL DEFECTS AND BLOCKAGES, AS IDENTIFIED ON NATIONAL HIGHWAYS DRAWING(S) HAVE BEEN RECTIFIED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
11. THE LINE, LEVEL AND CONDITION OF ALL EXISTING DRAINAGE AT CONNECTION POINTS IS TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
12. THE LOCATION AND DEPTH OF ALL EXISTING SERVICES IN RELATION TO THE DRAINAGE IS TO BE IDENTIFIED PRIOR TO CONSTRUCTION. ANY CONFLICTS ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
13. POST CONSTRUCTION THE CONTRACTOR SHALL PROVIDE AS-BUILT RECORDS FOR THE WORKS INCLUDING A FULLY INTEGRATED, CLEARLY REFERENCED CCTV SURVEY RECORD FOR EACH DRAIN RUN. THE RECORDS ARE TO BE SUBMITTED IN HARD COPY AND ELECTRONIC FORMAT ON CD IN TRIPLICATE.
14. COMBINED KERBDRAIN (CKD) INVERT LEVEL SHOWN ON CKD DRAWING AND SCHEDULE IS INVERT LEVEL OF OUTLET SUMP UNIT. CKD INVERT LEVEL ON CHAMBER SCHEDULE IS INLET CONNECTION PIPE LEVEL FROM CKD UNIT.
15. TOPOGRAPHICAL SURVEY BY GARTELL & SON LTD, REF. N/A , DATED 23.05.2019.
16. TOPOGRAPHICAL SURVEY DATA SUPPLIED BY CLIENT. ALL DIMENSIONS, LEVELS AND SURVEY GRID COORDINATES ARE TO BE CHECKED BY THE CONTRACTOR AND ANY DISCREPANCIES ON THIS DRAWING OR ON SITE MUST BE REPORTED TO THE PROJECT MANAGER IMMEDIATELY.
17. ALL LEVELS ARE GIVEN IN RELATION TO ABOVE ORDNANCE DATUM (AOB) UNLESS STATED OTHERWISE.
18. FINISHED FLOOR LEVELS ARE SUBJECT TO REVIEW AND SHOULD BE CONSIDERED +/- 450MM.

Rev	Details	Drawn	Checked	Auth	Date
P04	Foul water treatment added	PB	JAK	JAK	19.07.2023
P03	Flood routes added	PB	JAK	JAK	18.07.2023
P02	Levels updated to suit latest survey	PB	JAK	JAK	04.07.2023
P01	Initial issue	PB	JAK	JAK	22.05.2023

Drawing Status: FOR STAGE APPROVAL — Suitability: S4

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Client:

Project Title: HARVEST LANE, CHARLTON HORETHORNE

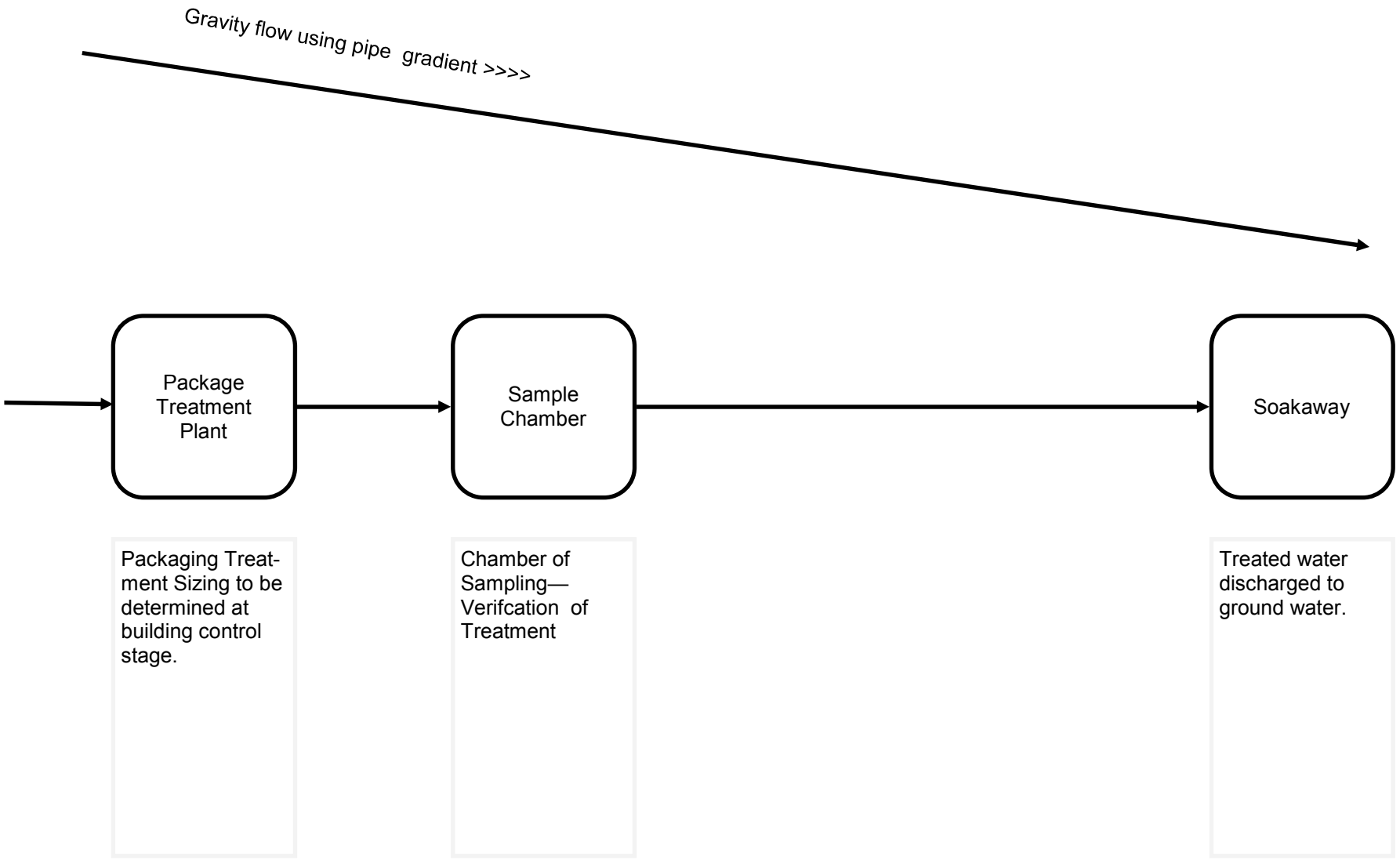
Drawing Title: DRAINAGE STRATEGY

Scale	Designed	Drawn	Checked	Authorised
1:500	PB	PB	JAK	JAK
Original Size	Date	Date	Date	Date
A1	22.05.2023	22.05.2023	22.05.2023	22.05.2023

Drawing Number: PIN/Proj. Ref. No. | Originator | Volume | Location | Type | Role | Number
VD23849 - VEC - S104 - XXX - DR - CD - 3000

Project Ref. No.: VD23849

Revision: P04



Harvest Lane —System Schematic —NTS

APPENDIX 2

Budget

Stage 1

Stage 1 — Calculate Total Phosphorous (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	2	dwellings
Average occupancy	1.65	persons/dwelling
Number of houses proposed	29	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	**73**	**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 such contact the council and bespoke calculations may be used.

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.

Is sewage to be handled by wastewater treatment works? No

Is sewage to be handled by Package Treatment plants? Y

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 Phosphorous concentration of the influent is calculated by multiplying the number of people by the expected water usage per day. The Phosphorous concentration within the effluent is calculated by applying the discharge level of the appropriate WwTW. The Phosphorous loading is expressed in kg/year.

Calculate the wastewater volume generated	Value	Unit
Total population increase generated by the development	0	Persons
Water use per person	110	Litres/person/day
Wastewater volume generated by the development	**0**	**Litres/day**

Confirm receiving WwTW and permit limit	Value	Unit
Select the WwTW the development will connect to	Ads	
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

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 Phosphorous effluent is calculated by applying the PTP reduction efficiency. The Phosphorous loading is expressed in kg/year.

Calculate TP load prior to treatment	Value	Unit
Total population increase generated by the development	73	Persons
Average Phosphorous loading per person	0.99	Kg/person/year
Total Phosphorous prior to treatment	**72.17**	**Kg/year**

Calculate TP load after treatment	Value	Unit
Receiving PTP reduction efficiency	95	%
Total Phosphorous discharge after PTP treatment	3.61	Kg/year

Note: The user mist 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 90% can be used.

Calculate TP load from development wastewater with on-site PTP	Value	Unit

TP discharged by WwTW	0	mg/day
TP discharged by WwTW	0.0000	Kg/day
Phosphorous loading from WwTW	**0.00**	**Kg/year**

PTP Total Phosphorous load	**3.61**	**Kg/year**

3.	Calculate the additional population TP load	Value	Unit
	Total Phosphorous load from additional population	**3.61**	**Kg/year**

Stage 2

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
	Enter the total area of the development site	**3.410**	**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

Urban development		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
Cereals		Hectares
Dairy	3.410	Hectares
Cropping		Hectares
Horticulture		Hectares
Pig Farming		Hectares
Lowland Grazing / paddock		Hectares
Mixed livestock		Hectares
Poultry Farming		Hectares
General Arable		Hectares
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	**3.410**	**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	**0.63**	**Kg/year**

Stage 3

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, proposed by either the developer or the Council 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	**3.410**	**Hectares**

2. Identify proposed land uses of the development site

	Value	Unit
Urban development	1.570	Hectares
Open Space / Greenfield	1.210	Hectares
Woodland	0.520	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	0.11	Hectares
Banking coefficient	8	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	**3.410**	**Hectares**

4. Calculate TP from proposed land usage

	Value	Unit
TP load from proposed land usage	**0.60**	**Kg/year**

5. Calculation of gross P loading

	Value	Unit
Gross TP load from current and proposed land usage	**3.58**	**Kg/year**

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

Stage 4

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

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

		Current	AMP7		Summary	
					No. of dwellings	31
1.	Identify the Phosphorous load from additional population	Value	Value	Unit	PTP efficiency (	95
	Phosphorous loading from additional population	**3.61**	**3.61**	**Kg/year**		
2.	Calculate net change in Phosphorous load from land use change	Value	Value	Unit	TP current land use	0.63
	Phosphorous load from land use change	**-0.03**	**-0.03**	**Kg/year**	TP proposed land use	0.60
3.	Calculate phosphorous budget for the development site	Value	Value	Unit		
	Phosphorous budget for the site	**3.58**	**3.58**	**Kg/year**		
4.	Calculate phosphorous budget precautionary buffer	Value	Value	Unit		
	Buffer amount	20	20	%		
	Phosphorous precautionary buffer	**0.72**	**0.72**	**Kg/year**		
5.	**Total phosphorous budget for the development site**	Value	Value	Unit		
	Total Phosphorous budget for the site	**4.30**	**4.30**	**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.

Current WwTW Permit levels

Development will generate additional Phosphorous (Mitigation required) - Please progress

AMP7 WwTW Permit levels

Development will generate additional Phosphorous (Mitigation required) - Please progress

APPENDIX 3

Monitoring

Monitoring Requirements

The phosphate removal in the proposed system is achieved using an Iron Dosing System. The sampling should take place at the final discharge point (outfall to river or pond, or sampling chamber if soak-away). The sample should then be sent to a UKAS accredited laboratory and tested for total Phosphate. We have derived a trigger level, where by if Phosphate rises above the calculated figure below then the filter media will need to be replaced.

Trigger Level is **0.30** mg/l

Maintenance

PTP - The PTP will require desludging at intervals as prescribed by manufacturer. If the high level alarm is activated then a desludge will need to be actioned in the sort term. The PTP will also require an annual inspection, by a suitable contractor to check for fouling of moving parts, and efficacy of pumps and valves.

SUDs - Annual maintenance of the SUDs basin will include trimming of reeds & vegetation. Again inflow and outflow should be compared to check that hydraulic conductivity is remains adequate.

APPENDIX 4

PTP PIA

Certificate

353.02C02

Kingspan Water & Energy Ltd.
College Road North, Aston Clinton, Aylesbury, HP22 5EW, UK

EN 12566-3, Annex B
Small wastewater treatment systems for up to 50 PT

Small wastewater treatment system BioDisc +P
Rotating Biological Contactor (RBC) in a GRP tank with chemical dosing equipment

Test report PIA2019-353B47.02
This test certificate is a revised version of test certificate no. 353.02C01.

Nominal organic daily load (influent)	0.28 kg BOD_5/d		
Nominal hydraulic daily load	0.9 m^3/d		
Material	GRP		
Treatment efficiency		Efficiency	Effluent
(nominal sequences)	COD	95.9 %	31 mg/l
	BOD_5	98.0 %	6 mg/l
	N_{tot}*	71.1 %	17.9 mg/l
	NH_4-N*	92.1 %	3.0 mg/l
	P_{tot}	95.4 %	0.3 mg/l
	SS	95.6 %	15 mg/l
Electrical consumption	1.5 kWh/d		

**determined for temperatures ⩾ 12 ° C in the bioreactor*

Performance tested by:

PIA – Prüfinstitut für Abwassertechnik GmbH
Hergenrather Weg 30
52074 Aachen
Germany

This document replaces neither the declaration of performance nor the CE marking.

PIA - Sustainable Certification

geprüft - tested- testé

Notified Body No.: 1739

DAkkS Deutsche Akkreditierungsstelle D-PL-17712-01-00

Martina Wermter December 2020