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4th April 2024

To whom it may concern,

Lower Rackery, near Llay, Wrexham, LL12 OAG

Habitat Regulations Assessment

Introduction

The proposed development is located at Lower Rackery Farm, Dark Lane, Rossett, Wrexham, LL12 0AG (National Grid Reference SJ 3270 5754). The proposed development area will extend to approximately 3640 m^2 and comprises of the existing farm buildings and surrounding land.

The development is small-scale and will comprise of the conversion of the farm buildings to provide a single dwelling. As part of development proposals, new foul water drainage solutions would be provided the site. Insensitive drainage design could negatively impact the River Dee Special Area of Conservation (SAC).

Watercourses characterised by submerged or floating-leaved vegetation form a priority habitat of international importance, and are listed on Annex II of the Habitats Directive. Concern has been increasing about recent declines in macrophyte diversity in European rivers. This has been attributed to a number of interrelated factors, including nutrient enrichment, siltation, low flows arising from drought and over-abstraction of groundwater, and unsuitable management practices.

In January 2021, NRW published a report which presented an assessment of phosphorus levels within Welsh SAC rivers against water quality targets. The review showed that 60% of SAC river catchment with failing to meet revised water quality targets for phosphorus.

Phosphorus is naturally present in river environments but at very low levels. Human activities such as agriculture and discharge of treated wastewater elevate levels of phosphorus in river flow.

High concentrations of phosphorus lead to the process of nutrient enrichment, also known as eutrophication, and can alter the balance of plant species in our rivers causing significant ecological damage.

Some new developments such as housing or agricultural enterprises can lead to increased amounts of phosphorus entering the river environment from additional wastewater or from poor management of manures and slurries.

In SAC catchments failing to meet phosphorus targets (including the River Dee), it is possible that new developments can be authorised if it can be demonstrated they will not lead to further deterioration of water quality in the SAC water bodies failing to meet water quality targets and will not undermine the ability for the SAC to meet its conservation objectives. This may be achieved if:

- developments are not a source of phosphorus or
- developments are a source of phosphorus but there is no pathway for it to enter the SAC river environment or

- measures associated with a given development are put in place so that nutrient neutrality can be achieved and that development does not lead to a net increase in phosphorus entering the SAC river environment.

This letter provides further consideration of the development proposal's potential impacts upon the identified European designated sites and makes recommendations for appropriate mitigation measures to minimise the risk of any significant impacts from increased release of phosphorus.

This letter has been produced by Richard Roe. BSc MSc MCIEEM CEnv with advice on drainage solutions and related phosphorus release provided by Jason Jones BEng Civils (Hons) MCIHT CIWEM.

Richard is an ecological consultant with over 20 year's professional experience.

Jason is a drainage consultant with over 20 years professional experience.

Habitat Regulations Assessment Overview

The EU Habitats Directive is transposed into UK law by the Habitat Regulations. The purpose of the Habitats Directive is to conserve natural habitats and wild species across Europe by establishing a network of sites known as Natura 2000 sites. Sites protected under the Habitats Regulations include Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs).

In accordance with Article 6(3) of the Habitats Directive, an appropriate assessment must be carried out where a new project could affect the designated interest features of a European Site (either on its own or in combination with other projects).

The first stage of the Habitat Regulations Assessment (HRA) comprises of screening of the project for likely significant effects. If significant effects cannot be ruled out, the HRA will also require an appropriate assessment in order to determine the effects of the proposals on the protected site's integrity.

Designated Sites - River Dee & Bala Lake

The River Dee is located 7.6km to the east of the site. The River Dee is designated as a Special Area of Conservation and is a Site of Special Scientific Interest.

The River qualifies as a SAC principally on account of Annexe II species present but the River also supports Annexe I habitats.

Qualifying features of the SAC are:-

- Annex II Species (primary reason): Atlantic salmon, Floating water-plantain.
- Annex II Species (qualifying reason): Sea lamprey, Brook lamprey, River Lamprey, Bullhead, Otter.
- Annex I Habitat: Water courses of plain to montane levels with the *Ranuncu/ion fluitantis* and *Callitricho-Batrachion* vegetation.

Below Bangor-on-Dee the River Dee flows into the Cheshire plains and displays typical characteristics of lowland river types with shallow gradients flowing over nutrient rich soils, with pondweeds such as curled pondweed *Potamogeton crispus,* perfoliate pondweed *Potamogeton perfo/iatus* and small pondweed *Potamogeton berchtoldii* occurring frequently. Tripartite bur-marigold *Bidens tripartita* and lesser pondweed *Potamogeton pusil/us,* both rare along Welsh rivers, are found in this section. Such plant species would qualify as Annex I Habitat

This section is a lowland, clay-dominated river type but due to overgrazing of the margins and eutrophication this vegetation component is threatened and frequently species-poor. Fennel pondweed *Potamogeton pectinatus* also occurs here and in the more eutrophic sections may be the only submerged species.

Habitats within the lowland reaches of the River Dee (relevant to the Lower Rackery Farm site) include qualifying Annex I habitats.

Stage 1- Assessment of Potential Negative Effects of Proposed Development

The proposed development is small in scale comprising of the conversion of a single dwelling including toilets, showers and a bath. The proposed development will cover an area of less than 3700 m^2 and will be located within previously developed land comprising of the existing Lower Rackery Farm.

The Lower Rackery Farm site is set at a relatively high level above the River Dee. The river is approximately 7.6km to the east of the site. The application site is at the upper catchment boundary between an area that drains west towards the river at Cefn-y-bedd and an area that drains east towards a sub-catchment of an unnamed ditch.

The Lower Rackery Farm site is located within the River Dee catchment. Therefore, treated wastewater arising from the proposed residential development could lead to minor increased levels of phosphorus entering the River Dee catchment.

Therefore, in the absence of mitigation, there is considered to be a minor risk of potential adverse effects on the nearby River Dee in association with the proposed foul drainage works.

Given the distance of the River Dee from the proposed works areas, there are not considered to be any other significant pathways linking the development site and the River Dee SAC.

Stage 2- Appropriate Assessment

Appropriate Assessment determines whether a proposal will have a negative effect on the integrity of international and national designated sites.

A distinction has been made between embedded mitigation measures (which are essential features and characteristics of the development proposals), and additional mitigation and avoidance measures which are designed to avoid significant effects upon the relevant designated sites.

As part of the development, a foul water drainage solution has been devised by Jason Jones of floodflow.co.uk.

The proposed drainage design (see drawing 23161-001 revision A) includes a BioDisc sewage treatment plant to remove phosphates from the foul drainage. If phosphates can be removed from the foul water drainage, then any negative impact associated nutrient enrichment arising from this development can be avoided.

High concentrations of phosphorus can lead to the process of nutrient enrichment which can alter the balance of riparian plant species leading to ecological damage.

Table 1 below provides a summary of the Assessment.

Receptor	*Adverse effects*	*Proposed mitigation*	*Adverse Effects on Site Integrity with Mitigation*
Qualifying features of international and national sites: *River Dee is designated as a SAC with key sensitive habitats comprising of submerged aquatic vegetation*	*Increased nutrient enrichment from elevated levels of potassium within foul water drainage can damage aquatic habitats and riparian plant communities.* *Site is located within the River Dee catchment.*	*Foul water drainage to include a BioDisc sewage treatment plant. This will be to limit the release of phosphates into the River Dee catchment through foul water drainage.*	*Provided the BioDisc sewage treatment plant is installed and appropriately maintained, the risk of significant release of phosphates into the Dee catchment is considered to be minimal.*

Table 1 - Summary of Appropriate Assessment

Biodisc Arrangement and Safety Features

BioDisc have been used on multiple sites in Wrexham designed to cater for homes without access to main drainage. The general arrangement of the BioDisc is shown below;

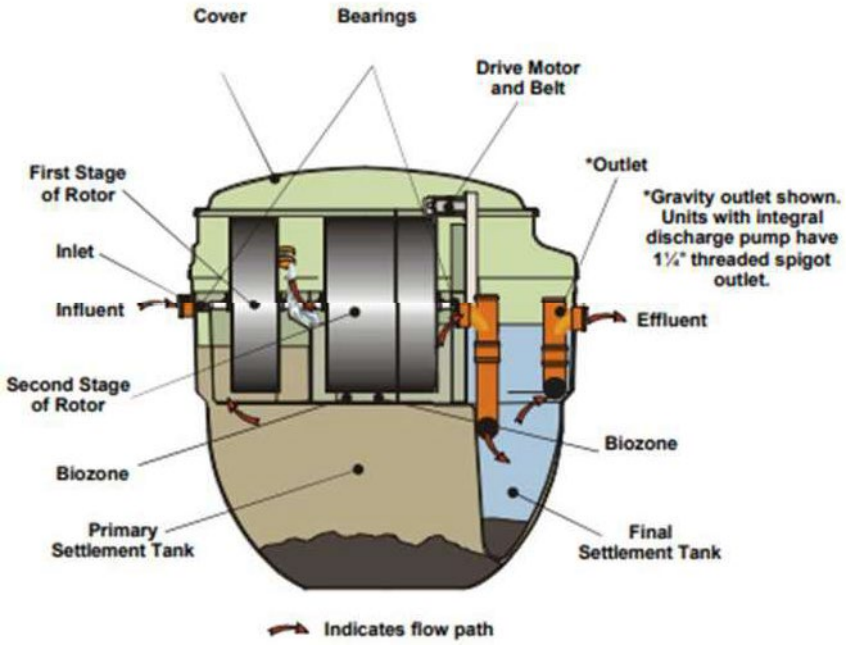


Figure 1 General Arrangement of BioDisc System

The BioDisc may fail during the lifetime of use and Klargester provide a maintenance manual and a summary table is shown below. Should the BioDisc not be maintained or fail then phosphates would enter the River Dee. However, the two key bolt on additions and maintenance to prevent contamination of the River Dee would be as follows;

- Maintenance including desludging every 6 months.
- Telemetry link located in the dwelling to alert the occupant.
- Chemical Dosing Unit.
- Drainage Field

Maintenance

A maintenance strategy is recommended by Kalagester for the BioDisc and will be followed by the owner of the development. Figure 2 and 3 below show tables for fault finding and the maintenance period for their product.

Model	BA	BB/NB	BC/NC
Primary Settlement Tank	2200 litres (485 galls)	2200 litres (485 galls)	4580 litres (1009 galls)
Final Settlement Tank	400 litres (88 galls)	400 litres (88 galls)	850 litres (187 galls)
Desludge Period	12 months Maximum	6 months Maximum	7 months Maximum
You should not exceed the maximum desludge periods given above.			

Figure 2 - Extract from BioOisc Maintenance Manual

SYMPTOM	CAUSE	ACTION
Strong odour	Excessive build up of sludge and scum	Desludge the unit.
	Grease (white/cream crust in primary tank and/or thick, smooth biomass[1])	De-sludge unit. If necessary hose off discs. Avoid excessive use of fats and oils. Please note removal of Biomass will reduce treatment until new Biomass establishes.
	Chemicals in the system (very sparse or no biomass[1])	In most instances, units will recover naturally from toxic inhibition events. Refer to section 4 of the Owners Handbook for general guidance on use of domestic chemicals.
	Excessive laundry use (thick, stringy whitish biomass[1] on first section)	Spread out laundry operations. Avoid biological powders where possible and use the minimum possible amounts of detergent. Refer to section 4.
	Unit overloaded (thick/grey biomass[1]) over most of rotor	Check section 1 of the Owners Handbook for the process capability of the unit. If in doubt, contact Klargester.
	Rotor stopped	See rotor stopped section below.
	Drains inadequately ventilated	Check that there is an open high level vent at the head of the drains (not "Durgo" valve or tile vent).
Rotor stopped	Switched off	Check that the motor switch on the panel is in the "on" position. Re-set if necessary.
	Power failure	Check the fuse/trip at the supply board. Replace/re-set as necessary. If the problem persists, contact Klargester.
	Wiring fault	Have the wiring to control panel checked by a competent electrician. If the supply wiring is OK contact Klargester.
	Drive belt broken	Contact Klargester.
	Drive motor faulty	Contact Klargester.
	Loose pulleys on rotor or gearbox output shaft	Contact Klargester.
Rotor fails to re-start after a stoppage	Rotor unbalanced	Hose off excess Biomass on the heavy side of the rotor. Note removal reduces treatment.
Rotor turns intermittently	Drive motor overheating	Contact Klargester.
Effluent discharge not to required standard	See strong odour and rotor stopped sections.	
	Managed flow system in-operative.	Check that bucket(s) are in place and discharging correctly into the biozone second stage.
	Sludge return pump inoperative (NB/NC only)	Contact Klargester.
Unit flooded (units with integral discharge pump)	Discharge pump not working.	Check that the pump switch on the panel is in the "on" position. Re-set if necessary. Check that pump control float is clear of obstructions and set at the correct length If the problem persists consider emptying unit to protect motor and gearbox and contact Klargester or service provider. (See Section 5).

Figure 3 - Extract from BioDisc Maintenance Manual

Chemical Dosing Unit

Various methods have been employed to reduce the levels to varying degrees of success. One common method is to add chemicals such as ferric sulphate to sewage, for example, to reduce phosphate levels at the beginning of any processing.

Chemical dosing is an effective method for reducing septicity between the BioDisc and the River Dee receptors. The inclusion of the unit will reduce level of phosphates, P_{tot} *to 0.3 mg/l. See Figure 4 below for the treatment efficiency of the prescribe unit.*

Nominal organic daily load (influent)	0.28 kg BOD/d		
Nominal hydraulic dally load	0.9 m'/d		
Material	GRP		
Treatment efficiency (nominal sequences)		Efficiency	Effluent
	COD	95.9%	31 mg/l
	BOD_5	98.0%	6 mg/l
	N,Ol·	71.1 %	17.9 mg/l
	NH◄-N"	92.1 %	3.0 mg/l
	PlOl	95.4 %	0.3 mg/l
	SS	95.6%	15 mg/1
Electrical consumption	1.5 kWh/d		

Figure 4 – BioDisc including Chemical Dosing unit

Drainage Field

Evidence has shown that it is the aerated soil zone of the drainage field which provides the function of removing the phosphorus from the effluent before it enters a receiving waterbody (surface or groundwater).

The location of the drainage field has been located 40m from the ditch located adjacent to the development site, see Figure 5. This will provide further percolation and reduced phosphates prior to entering the watercourse.

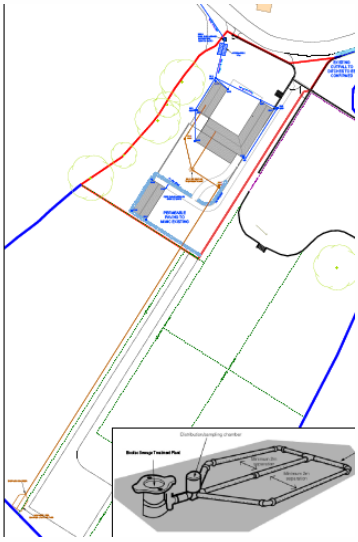


Figure 5 - Location of Drainage Field

Conclusions

The proposed development is located at the Lower Rackery Farm site. The development is relatively small scale and will comprise of the renovation and conversion of an existing farm including toilets, showers and a bath for occupants.

The Lower Rackery Farm site is set at a relatively high level above the River Dee. The river is approximately 7.6km to the east of the site. The River Dee SAC is a designated site of international importance. Therefore, this Appropriate Assessment has considered potential adverse effects on the adjacent designated site.

With regards to this development, in the absence of mitigation, there is considered to be a minor risk of potential adverse effects on the nearby River Dee in association with the proposed foul drainage works.

In order to prevent potential adverse effects on the River Dee, floodflow.co.uk. have devised a drainage design which will include a BioDisc sewage treatment plant to remove phosphates from the foul drainage. If phosphates can be removed from the foul water drainage, then any negative impact associated nutrient enrichment arising from this development can be avoided.

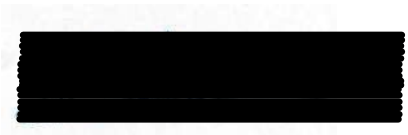
It is the professional opinion of Jason Jones, the drainage consultant that *"The BioDisc with the Chemical Dosing Unit* releases *just* 0.*3mgll of phosphates. However, when you consider that the discharge flows into* a *drainage field, percolates into the ground before entering the watercourse, which* is *about 20m from the location of the BioDisc, I would consider the effect negligible in terms of the impact of phosphates on the River Dee."*

Provided that the BioDisc successfully removes phosphates from the foul drainage and providing that the maintenance regime for the proposed BioDisc is followed and strictly adhered to, it is considered to be highly unlikely that the proposals will result in any significant release of phosphates into the River Dee.

Given the small scale of the development and the likely low risk of the development to the designated sites. This level of mitigation is considered to be appropriate and proportionate.

Should you have any queries, then please do not hesitate to contact me.

Yours sincerely



Richard Roe BSc Msc CIEEM CEnv

Ecologist