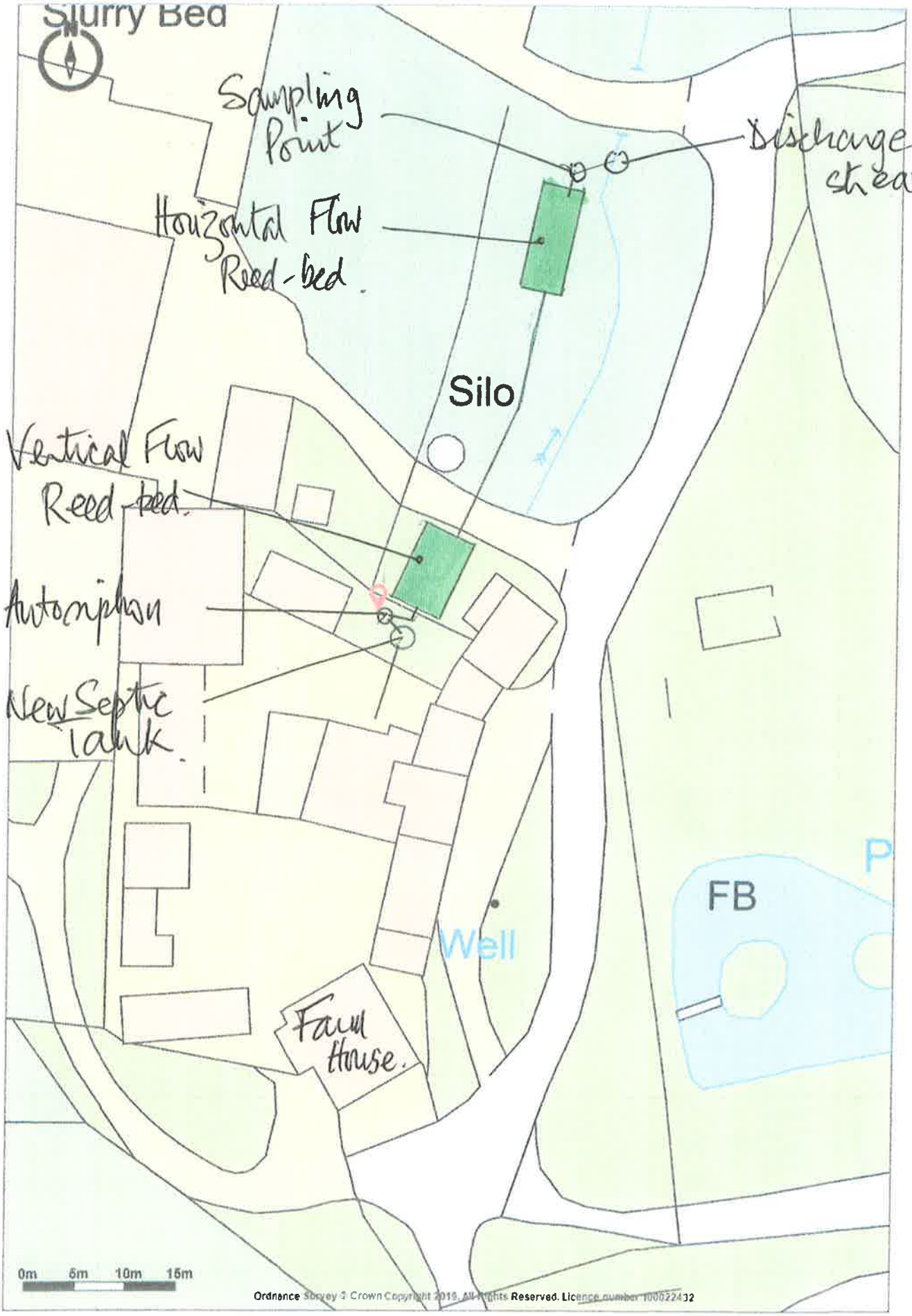

Promap V2

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EASTMOOR FARM.

DOCUMENT 1

DOCUMENT A - Synopsis of Operation & Maintenance Procedures

Check the whole system for correct operation once a week. ❐

Note: This is to be a visual check to see that effluent is being discharged onto and distributed over the entire surface of the vertical flow reed-beds, that the autosiphon is working correctly and to check for any damage however caused.

Periodically open autosiphon chamber and check that autosiphon is working correctly ❐

Note: Check that the outlet aperture of the autosiphon is not blocked wholly or partially with debris or fatty deposits. Clean as necessary.

Check levels of surface sand layers in the vertical flow reed-bed. If pooling of water occurs in any areas rake or transfer sand from higher levels to ensure that effluent spreads out evenly over the whole surface of the bed. ❐

Note: This procedure applies within the first few weeks of the reed-bed coming into action, as the sand settles, and then by and large requires no further action.

During the first two years of operation particularly weed all the beds on a regular basis during the spring and summer especially. ❐

Note: Remove weeds while they are still small and do not allow any to mature and go to seed. This can be done on a weekly, two-weekly or monthly basis as suits. At the start of the growing season it may require more frequent action. Once the reeds are established weeds will present much less of a problem.

Especially in the Autumn and early winter, but also throughout the year, keep the reed-beds clear of excessive amounts of falling leaves from neighbouring trees, if relevant. ❐

Note: Do not allow dead leaves to accumulate and form a soggy blocking layer.

At the end of the second full growing season cut the reeds and remove the stems and leaf debris from the beds. Leave stubble 75 - 100 mm high. Repeat annually thereafter. ❐

Note: We do not recommend the use of a strimmer to cut the reeds. Use shears or a sickle. If a strimmer is used all cut plant material must be removed from the surface of the bed.

De-Sludge Septic tank every 12-24 months. ❐

Every 3 months, or as experience proves is necessary:

1. **Inspect the autosiphon chamber and autosiphon.** ❐

   Make sure the outlet aperture is free of blockages. Hose down and clean as necessary to remove fatty deposits.

2. **Inspect the outlets for the effluent supply distribution pipes,** ❐

   monitor flow of water through supply and drainage pipes and make sure all are free running. Clean as necessary.

Please Note the following:

Recommendations and requirements described in O & M Section 3.15 regarding materials, detergents and other substances that should not be put into the drains.

DOCUMENT 2 - Management System

The Operation & Maintenance of the Reed-bed system, from and including the septic tank to the point of discharge into the wetland system, will be undertaken in accordance with the procedures and recommendations as described in the Operation & Maintenance Instructions that will be provided by Cress Water Solutions, the designers and supervisors of the installation of the Combination Vertical & Horizontal Flow Reed-bed System to be installed at Eastmoor Farm, Manorbier, near Tenby. A summary of these procedures is given in Document 1.

We (Cress Water Solutions) recommend that the septic tank is emptied every 12-24 months according to use, using a recognised Septic Tank De-sludging Company. A service agreement may be entered into with such a company once the frequency of required emptying has been established. Otherwise the names and contact details of up to three different local companies will be kept on record by the applicant in case of an emergency.

In the event of an emergency situation and the (unlikely) failure of the reed-bed treatment system Cress Water Solutions will be contacted in the first instance for advice and support. As Cress Water Solutions is based north of Exeter and may not be able to respond with a site visit immediately, the applicant may choose to sort out the particular problem him or herself or use local specialist companies according to the nature of the problem, following advice from Cress Water Solutions. The likely causes of failure are simple and easily rectified in these low maintenance gravity driven systems. The first recourse for advice and resolution of the problem will be Cress Water Solutions.

A Maintenance Record will be maintained. This will detail all inspections carried out, dates and times, and list actions taken. Dates when the septic tank is emptied will be recorded.

All of Cress Water Solutions' reed-bed systems, that include vertical flow reed-beds, are provided with a three-year warranty. This warranty is conditional upon good and sensible practice with regards to the detergents, use of bleach and antibiotic agents and other household products that may be flushed down the toilets or disposed of via the sinks. A copy of the warranty is supplied to the client, and is attached to this statement.

DOCUMENT 3 - OUTLINE OF TREATMENT PROCESS

Foul water from the toilets and wastewater from the sinks, bath and washing machines run into a septic/settlement tank where solids settle out. The settled effluent, with its high BOD and some suspended solids, is displaced from this tank by fresh incoming foul wastewater.

At Eastmoor Farm this settled effluent is treated to a good quality by means of a combination vertical and horizontal flow reed-bed system. In this instance the usual Sub-Surface Flow - Horizontal Flow Reed-bed following a single large Vertical Flow Reed-bed is replaced with a Free Water Surface - Horizontal Flow Reed-bed in the form of a broad ditch which has been planted with marginal plants and will in time become fully vegetated. This ditch discharges to a minor stream.

The whole system is gravity driven requiring no electrical energy input. In such systems the settled effluent flows first into an Autosiphon Chamber. When the water rises to a predetermined level the autosiphon is automatically triggered and a fixed volume of effluent - a dose - is supplied rapidly to the reed-bed. Thereafter water continues to flow through the whole system by gravity.

The method of dosing the reed-beds using an autosiphon ensures that the beds are rapidly pulse flooded leading to a relatively even distribution of the effluent over the entire surface of the bed(s) and possibly temporary ponding.

Effluent dosed to the surface of the vertical flow reed-bed percolates quite rapidly down through the sand and gravel layers, pushing air ahead of it and pulling air down behind it. Drainage pipes located at the base of the bed collect the filtered effluent and pass it on to the next stage of the treatment process. The liquid draining out from the bottom of the bed enables the spaces in the gravel and sand matrix to fill back up again with air. This stage of treatment is aerobic in nature and eliminates smells rather than creating them.

Roofing tiles placed under the pipes where the discharges take place, prevent holes being excavated in the sandy surface and help to reduce scouring.

The effluent from the vertical flow reed-bed flows next into one end of a free water surface – horizontal flow reed-bed (FWS-HFRB), flows through a shallow pond and discharges via a small gravel filter bank into a small stream via a Level Control & Sampling Chamber. The FWS-HFRB will be fully planted with a variety of marginal plants and will in time become fully vegetated. It will provide further treatment of the effluent discharged by the vertical flow reed-bed and will remove some of the nitrogen compounds and phosphate from the effluent. It will also act as a buffer against shock loadings.

Both reed-beds will be lined with a good quality waterproof liner with a 25 year warranty or constructed in waterproof containers.

The system has been sized to cater for a maximum resident population of up to 13 p.e. on the basis of a 4 bedroom house. The area of the first stage vertical flow reed-bed is 40 m2. The quality of the effluent from the vertical flow reed-bed is expected to be better than 10 : 10 : 3mg/litre for BOD5, SS and Ammoniacal Nitrogen respectively. Where it discharges at the end of the 80 metre long ditch into the head of the wetland in the lake the quality is expected to be near river quality. The sample point will be in the Level Control & Sampling Chamber at the end of the FWS-HFRB.

The discharge will be to a small stream that arises on the property at a large pond, flows through the property and eventually disappears into the ground.

DOCUMENT 4 - ENVIRONMENTAL RISK ASSESSMENT

The designated point of discharge for the Reed-bed System is a small stream that arises at a large pond on the property.

The stream, with no name, runs in a northerly direction from the farm a distance of approximately 700 metres before disappearing into the ground. The areas is characterised by a large number of small springs and minor streams.

The system will be constructed within the area of the farm buildings and adjacent to them. Some earth movement will be required to achieve the levels needed for the second stage horizontal flow reed-bed. This earth will be moved locally on the farm site.

The potential risks from the construction of the system are to surface water run-off in heavy rain and the release of sediments from the tracking of plant in wet weather conditions. To minimise these risks the following steps will be taken:

- Within reason works on site will not be undertaken in wet weather conditions.
- Works will generally only be undertaken during normal working hours (0700 - 2000 hours).
- RAMS will be completed before works are undertaken.

Reed-beds will either be lined with a waterproof membrane or constructed in brick, block or concrete and tanked with a waterproofing compound to prevent the escape of untreated polluted effluent into the ground or water courses.

Following completion of the construction phase the site will be fenced off, wetland and marginal plants planted, all disturbed ground tidied up and wild flower mixes sown to create a wildlife haven.

A full set of Operation & Maintenance Instructions will be provided to the owner and operator of the system

DOCUMENT 5 - Quality of Final Discharge

The overall treatment system aims to achieve a final discharge quality better than:

- BOD 10 mg/l
- SS 10 mg/l
- Ammoniacal Nitrogen 3 mg/l