



Land at Berrywood Lane, Bradley,
Basingstoke

Package Treatment Plant
Maintenance and Monitoring Plan

For

Mr Darrell Alden

Document Control Sheet

Land at Berrywood Lane, Bradley, Basingstoke

Mr Darrell Alden

This document has been issued and amended as follows:

Date	Issue	Prepared by	Approved by
10/12/2020	1.0	J Morgans	N Jaques

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1.0 Introduction

- 1.1 This Package Treatment Plant (PTP) Maintenance and Monitoring Plan has been prepared for Mr Darrell Alden for the proposed development of a residential dwelling on land at Berrywood Lane, Bradley, Basingstoke, Hampshire.
- 1.2 The existing site comprises paddock grazing land on which it is proposed to develop a single residential dwelling. The site is not within 30 metres of a foul sewer and therefore the proposed dwelling would require a Package Treatment Plant (PTP) to serve the new foul water load.
- 1.3 David Williams Landscape Consultancy has produced a Preliminary Landscape Appraisal 12th December 2019 and as part of this appraisal produced an Indicative Landscape Proposals Plan Drawing No. 0395 / L2, which is shown in Figure 1.0 below, but can be found in full in [Appendix A](#).

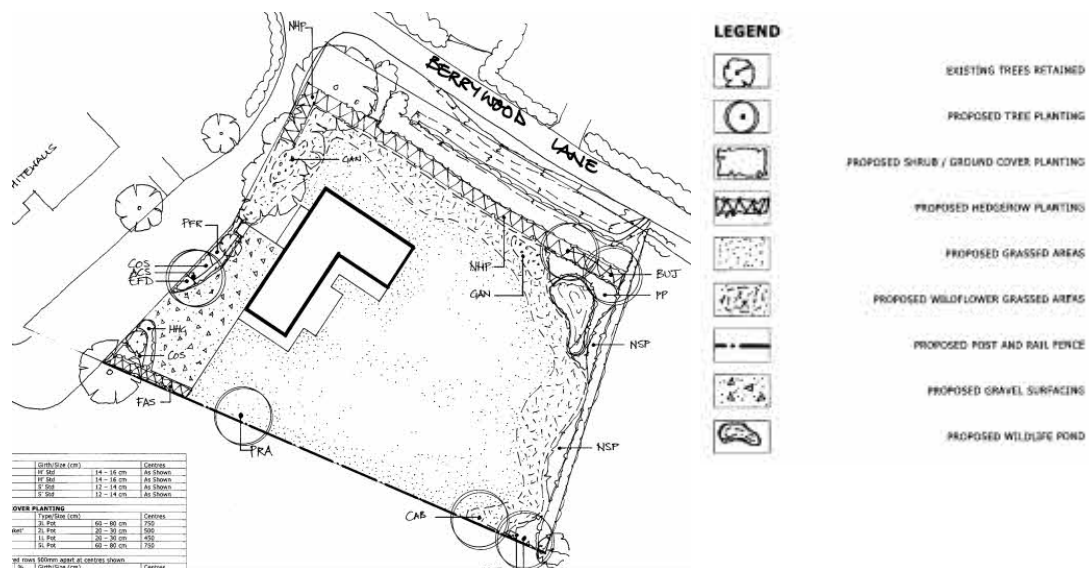


Figure 1.0. Extract of Indicative Landscape Proposals Plan.

- 1.4 The Local Planning Authority Basingstoke and Deane Borough Council requires to agree the details of the maintenance and monitoring of the proposed PTP, in order to give consent to the development, in consultation with Natural England and the Environment Agency. This PTP Maintenance and Monitoring Plan has been produced to support this planning application.

2.0 Package Treatment Plant

- 2.1 The requirements of the PTP are set out in the Nitrogen Nutrient Assessment document ref. 20048 dated 15/5/2020 produced by Aqua Callidus Consulting, and are summarised as follows.

Sewage load – 2.4 average household occupancy and 110 litres per head per day for housing.

PTP is to be located at the rear of the property.

The discharge point is not located within Source Protection Zone 1 (SPZ1) and is remote from sensitive receptors such that it is considered to meet the requirements of the Environment Agency general binding rules.

PTP will be a Klargester Biodisc +P PTP not exceeding 50 PT size, or a similar PTP that meets the required efficiency and performance requirements.

Performance requirements Total Nitrogen (TN) of 71.1% efficiency.

Environment Agency general binding rules (GBR)

- 2.2 General binding rules (GBR) apply to the PTP and these set out the rules and conditions that govern septic tanks and treatment plants, in order for them to be used without an Environmental Permit.

- 2.3 The GBR states that sites in or near sensitive areas described in the Environment Agency's designated sensitive areas list, will require an Environmental Permit for a PTP. The designated sensitive areas list includes the Special Protection Area (SPA) Solent and Southampton Water. DEFRA Magic Mapping shows that the site lies within the Solent Nutrient Impact Area. The Environment Agency would need to be contacted to determine if an Environmental Permit would be required for the PTP.

- 2.4 The method of discharge of the treated effluent will depend on either complying with the GBR and complying with the conditions of any Environmental Permit. For the GBR, the rules that govern whether the discharge is to surface water or to the ground are summarised below.

If the site is assessed to be within 500 metres of an SPA then the discharge to surface water will not comply with the GBR and will require an Environmental Permit. Discharge to the ground will comply with the GBR providing the site is assessed as not to be within 50m of an SPA.

If the site is assessed to be within 50 metres of an SPA then discharge to the ground or to surface water will require an Environmental Permit.

New discharges must be made to a watercourse that normally has flow throughout the year.

New discharges must not be made to an enclosed lake or pond.

- 2.5 For the development site the method of discharge will be either to the existing ditch that runs along the front of the site or to the ground via a drainage field, to be determined during the detailed design of the PTP.

- 2.6 As there is no existing watercourses and the ditch that runs along the front of the site is likely to run dry during parts of the year, then it is anticipated that the discharge will be to the ground via a drainage field.

- 2.7 A review of the British Geological Survey mapping shows that the underlying geology of the area consists of chalk with head deposits of clay, silt, sand and gravel. An infiltration test has been undertaken on the site, the results are included in [Appendix B](#). The infiltration test result show that the ground conditions are favourable to discharge to the ground, however this would need to be verified by undertaking a further shallow percolation test to determine the soil infiltration rate and the size of the drainage field. Instructions for undertake a percolation test are also included in [Appendix B](#).

Requirements for treatment system

- 2.8 A detailed design of the PTP would be required. The installation of the PTP treatment system is to be undertaken strictly in accordance with the detailed design, and in accordance with manufacturers requirements and the requirements of any Environmental Permit and the GBR.
- 2.9 At the outlet of the PTP and prior to the drainage field, a sample chamber would be installed to enable the collection of samples to allow the treated effluent to be tested.
- 2.10 Consultation has been undertaken with the Local Planning Authority Basingstoke and Deane Borough Council (BDBC) as part of the current outline planning application that is under consideration. As part of their response to this consultation, BDBC raised the requirement for wetlands associated with the outflows from the PTP. Wetlands are a surface feature and would be appropriate for providing additional treatment of discharge if the PTP discharged to surface water. As in this case the PTP would discharge to ground via a drainage field and treatment will be provided by filtration as the treated effluent infiltrates into the ground, wetlands would not be an appropriate choice for treatment and therefore there are no requirements to provide wetlands.

3.0 PTP Management and Maintenance Plan

- 3.1 The responsibility for the PTP, its management and monitoring, compliance with any Environmental Permit and the GBR, would be the responsibility of the "operator". The operator is the owner of the property. The duration of the responsibility would be in perpetuity until such time as the PTP is decommissioned and removed. If the property is rented the responsibility would remain with the owner of the property unless responsibility for the operation and maintenance of the PTP is transferred as part of the rental or leasehold agreement.
- 3.2 The PTP must be installed correctly and must be large enough to handle the maximum amount of sewage it will need to treat. If the amount of sewage the system needs to treat increases, such as if the property is improved or extended, then it is the responsibility of the operator to recalculate the maximum daily volume of discharge and determine if the treatment system is large enough, which would include contacting the installers of the system and the manufacturer of the PTP.
- 3.3 It is the responsibility of the operator to undertake monitoring of the treated effluent to ensure compliance with the requirements of the permission and to ensure that the PTP meets the performance and efficiency requirements. This monitoring would be undertaken by a competent contractor or engineer with associated laboratory support, appointed by the operator, to record levels of TN in the effluent to determine if it meets the performance requirements of Total Nitrogen (TN) 71.1% efficiency. The analysis must be done by a laboratory with the appropriate accreditation. The sampling and testing would be undertaken annual for the lifetime of the PTP and a complete set of records of the testing undertaken, will be kept by the operator.
- 3.4 The maintenance of the PTP is the responsibility of the operator. The PTP is required to be regularly emptied and maintained in accordance with the manufacturer's instructions. It is to be undertaken by a competent contractor or engineer appointed by the operator, such as those included on British Water's list of accredited service engineers.
- 3.5 The sludge that builds up in the PTP is required to be removed before it exceeds the maximum capacity and as a minimum the PTP is required to be desludged once a year. Routine maintenance checks and servicing of the PTP would also need to be undertaken annually and for the lifetime of the PTP, and a complete set of records of the desludging, maintenance and servicing work undertaken, is required to be kept by the operator.
- 3.6 For the proposed Klargester Biodisc +P PTP, the procedure for desludging is included in [Appendix C](#). The owner handbook for this PTP is included in [Appendix D](#), which includes a full description of the routine maintenance and service requirement for the PTP and includes requirement for the operator to undertake routine checks. These requirements and maintenance frequencies are included in Table 3.1.
- 3.7 Table 3.2 details the requirements and frequencies of the monitoring and maintenance for the drainage field.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance and Servicing	Desludging of PTP with suction tanker.	Prior to the build-up of sludge exceeding the maximum capacity of the PTP and as a minimum once a year.
	Routine maintenance and servicing of PTP	Annually
Monitoring	Visual check of the general condition of the PTP and the appearance of the Biomass.	Monthly for 3 months after installation and thereafter every 6 months.
	Check that the inlet and outlet pipes, inspection chambers and sampling chamber are clear of debris	Every 6 months
	Check the dosing buckets are transferring liquid consistently from the first to the second biozone section.	Every 6 months
	Check that the pump float can move freely and switches the pump on and off as the level in the pump chamber rises and falls. Check that the high-level alarm float can move freely.	Every 6 months
	Check for unusual noises coming from the PTP, report any to maintenance engineer.	As required.
	Sampling and testing of the treated effluent.	Annually
Remedial Actions	Removal of debris from inlet and outlet pipework, inspection chambers and sampling chambers.	Every 6 months or as required.
	Clean dosing buckets with a water jet from a hose pipe.	
	Rodding / jetting of piped connections to PTP.	As required or every 3 years.
	CCTV survey of inspection chambers, and piped drainage networks	As required.

Table 3.1 Monitoring and maintenance requirements for Package Treatment Plant (PTP)

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Visual inspection of drainage field	Every 6 months
	Cutting excess growth of vegetation or grass cutting	At least two cuts per year.
	Removal of debris	As required
Monitoring	Visual inspection of inspection chambers to check that water is draining away and the inspection chambers and filter drains are clear of debris.	Every 6 months.
Remedial Actions	Removal of debris from sumps, inspection chambers and from filter drainage network.	Every 12 months or as required.
	Rodding / jetting of filter drainage network.	As required of every 5 years.
	CCTV survey of inspection chambers, and filter drainage network.	As required

Table 3.2 Monitoring and maintenance requirements for drainage fields

- 3.8 The owner handbook included in [Appendix D](#), advises on the impact of excessive concentrations of detergents, disinfectants, bleaches, nappy disinfectants and sterilising fluids; the impact of discharges from waste disposal units and concentration of liquids from home beer and wine making; all of which may impact on the operation of the PTP. The operator of the PTP shall ensure that these substances or high concentration of these substances, do not enter the foul drainage. The operator should also ensure that the following substances do not enter the foul drainage system.

Motor oil, grease, anti-freeze, brake fluid etc.

Cooking oil and fat

Weed-killers, insecticides and other gardening chemicals

Paint thinners, white spirit, turpentine, creosote etc

Chemical drain cleaners

Acid based brick / stone floor cleaners

Medicines

Photographic development fluid

Nappies, sanitary towels and any other solid objects

Record keeping

- 3.9 It is a requirement that the operator maintains and keeps safe a complete set of records of any monitoring and maintenance works that is undertaken on the PTP, which will also be required to prove compliance with the planning consent. The record is to include dates, full company details and company stamps documenting when works are undertaken by the accredited engineers or contractor who are appointed to carry out the work. The record shall include the following.

Record of desludging.

Service records.

Maintenance work.

A record of the dates when samples of the treated effluent are taken, and the laboratory test results.

Record of any remedial works.

- 3.10 If the property is sold, then a full set of these records will be required to be handed over to the new owner.

Decommissioning / replacement of PTP

- 3.11 At the end of its life, or if it is no longer required or is to be replaced, the PTP is to be properly decommissioned in accordance with the manufacturer's advice by a competent and accredited maintenance company. As part of the decommissioning the PTP is to be desludged and the sludge disposed to a facility licenced to take this waste to ensure that no substance remains that could cause pollution.

4.0 Summary and Conclusions

- 4.1 A package treatment plant (PTP) is required to treat the foul flow from the development of a single residential dwelling at Berrywood Lane, Bradley, Basingstoke, Hampshire.
- 4.2 The person(s) who is responsible for the operation, maintenance and monitoring of the PTP in perpetuity, or for the lifetime of the PTP, is the Operator. The Operator is the owner of the residential dwelling.
- 4.3 The treatment system will be a Klargester Biodisc +P PTP or similar product which can achieve the same efficiency and performance requirements. The PTP would discharge to the ground via a drainage field.
- 4.4 The system would meet the requirements of the Environment Agency general binding rules (GBR) for small sewage discharge to the ground. The GBR states that sites in or near sensitive areas described in the Environment Agency's designated sensitive areas list, will require an Environmental Permit for a PTP. The designated sensitive areas list includes the Special Protection Area (SPA) Solent and Southampton Water. DEFRA Magic Mapping shows that the site lies within the Solent Nutrient Impact Area.
- 4.5 The Environment Agency would need to be contacted to determine if an Environmental Permit would be required for the PTP.
- 4.6 This PTP Maintenance and Monitoring Plan details the maintenance, servicing, monitoring and testing that is required for the lifetime of the PTP, in order to meet the requirements of;

Good practice;

The EA general binding rules for small sewage discharge to the ground;

the Nitrogen Nutrient Assessment document ref. 20048 dated 15/5/2020 produced by Aqua Callidus Consulting, and;

The PTP manufacturer's recommended operation and maintenance requirements as set out in the Kingspan Biodisc owner handbook.

Appendix A – Indicative Landscape Proposals Plan – Drawing no. 0395 / L2

PLANTING NOTES

- Plant material to conform to the National Plant Specification. All plant stock to originate from within the UK. Plant handling and planting operations to be in accordance with HTA 'Handling and Establishing Landscape Plants', (Parts I- III).
- Topsoil to be fertile with maximum 35% clay content and 5% minimum organic content, pH 5.8 - 7.5 and to be free of perennial weeds, weed seeds and contamination. Maximum stone content 20% (20mm+ particle size), maximum size of stones 50mm in any direction.
 - Existing topsoil to be ameliorated and/or screened, if necessary, to achieve this specification.
 - Imported topsoil to be to BS 3882: Multi - Purpose Grade, from an approved source, and to accord with the above specification.
- Cultivation of all planting areas within the root protection areas (RPA) of existing trees beneath the canopies of existing trees is to be undertaken by hand using hand held tools only, taking care to avoid ground compaction or damage to tree roots. The use of tracked or wheeled machinery (including rotovators), must not be used and any time. Levels must not be raised (particularly by the addition / spreading of topsoil associated with any turfing or grass seeding works) or lowered, in any way unless specially approved by the Local Authority.

TREES:

- All trees to be planted at correct depth in square pits 2 to 3 times width of root ball / root spread and at shallow depth same as depth of root ball / root spread with spiked bottom full depth of fork (but not cultivated) to relieve any compaction and assist drainage backfilled with local topsoil mixed with 80 litres of peat free organic tree planting compost and 125g 'Sierrablenn Flora' slow release fertiliser, supported by 1 no. 100mm x 3000mm softwood timber stake and 1 No. adjustable tree tie.
- All trees are to be fitted with 'Greenleaf' 'Root-rain Urban' irrigation pipe and inlet, or similar approved, size as appropriate. All trees within 3m of existing or proposed footpaths or hard surfaced areas are to be planted with tree root barriers e.g. 'Greenleaf' Root 600 / 1000 placed between the tree and footpath / hard surfaced area. Root barrier to be 300mm deep adjoining hard surfaces but full depth adjoining services.
- No trees are to be planted within 3m of sewers or services (or other easement recommended by the relevant statutory undertaker) without the use of tree root barriers, e.g. 'Greenleaf' Reroot 600 / 100 placed between the tree and services. The Contractor is to ascertain the location of all sewers and services prior to carrying out any tree planting.

PLANTING BEDS:

- Planting beds to have a minimum depth of 450mm topsoil over 150mm broken up ground with all stones over 50mm removed. Soil conditioner: Sanitized and stabilised compost to BSI PAS 100. Apply 50mm depth even coverage and incorporate into topsoil during cultivation operations, to a minimum depth of 150mm. Compost to be Compost Association certified, or from an approved supplier conforming to this specification. If no local supplies are available alternative organic peat free compost may be specified, subject to the Landscape Architect's approval.
- Hedgerow plants to be planted in pits 150mm wider and deeper than root spread backfilled with excavated topsoil/compost, mixed with 'Sierrablenn Flora' slow release fertiliser, quantity in accordance with manufacturer's recommendations. Hedge plants to be planted in staggered rows 500 mm apart at centres specified in schedule.
- All planting beds (apart from marginal plants) to be mulched with matured coniferous bark, with an even particle size between 15 - 65mm, to a minimum depth of 75mm over weed free soil after completion of all planting and watering operations. Bark mulch is to be free from pests, diseases, fungus and weeds; and with no fines or dust. Source and sample of bark mulch to be approved.
- Marginal plants to be planted as per suppliers' instructions.

GRASS AREAS

- Grass areas are to have a minimum depth of 150mm topsoil brought to a fine tith all stones over 40mm (25mm for lawns), in any direction removed. Areas should be uniformly firmed. Apply pre-seeding fertiliser (e.g. British Seed Houses BSH2), prior to grass seeding, in accordance with manufacturer's recommendations. Do not apply to wildflower areas.
 - Grass seed mix to rear garden areas to be: GSS Cottage Lawn with micro clover mix, sown at a rate of 20g/msq in equal sowing in transverse directions.
 - Wildflower grass seed mix to rear garden areas to be: GSS Chalk Soil Wildflower seed mix mix, sown at a rate of 3g/msq in equal sowing in transverse directions.
 - Turf to be good quality lawn turves, to conform to BS 3936: 1998, free from undesirable grasses and weeds. Turfing operations to be carried out in accordance with the NBS Landscape Specification, Q30 - Seeding/Turfing, Clauses 430 and 440, the dressing to joints to be finely screened compost sand / topsoil.

ONGOING MANAGEMENT AND MAINTENANCE NOTES:

- Maintenance operations to be carried out as specified until planting becomes established (year 5 after planting).
- Trees - Check stakes and ties and adjust if necessary, in summer and winter. Remove stakes when no longer required, i.e. after 3 years. Prune out damaged branches or deadwood, cutting back so as not to affect branch collar. Progressively raise canopies of new trees to provide clearance for vehicles and pedestrians.
- Shrubs - Weed control measures to continue until canopy of shrubs is closed. Weeds are to be cleared by hand or by application of translocated herbicide, with inspections made regularly through the growing season. Prune back any badly damaged shrubs to sound growth. Cut back plants adjacent to paths and access ways where necessary, retaining a balanced shape. Clear litter and debris from planted areas and cut leggy growth hard back to promote bushy growth.
- Watering - Trees to be watered on weekly basis during growing season (April - October) at rate of 25L/tree at each operation for first two years. Watering to be from above and via pipe to ensure soaking of ground. After which, during periods of dry weather apply sufficient water to maintain healthy growth. Allow 10L/m2 to planting beds and 25L/tree at each operation.
- Re - firming - Ensure that all trees and shrubs are firmly bedded in the ground after strong winds, frost heave or other disturbances.
- Protection / Reinstatement - Regularly inspect all planting and grassed areas, e.g. once a month, for any pest damage or vandalism/damage caused by others. Any damaged to be reported to the Employer and rectified in the next available season by replacement planting or reseeding/ turfing and protective measures if required.

PLANTING SCHEDULE

TREE PLANTING				
Abbr.	Species	Girth/Size (cm)		Centres
ACS	Acer campestre	H' Std	14 - 16 cm	As Shown
BUJ	Betula utilis Jacquemontii	H' Std	14 - 16 cm	As Shown
CAB	Carpinus betulus	S' Std	12 - 14 cm	As Shown
PRA	Prunus avium	S' Std	12 - 14 cm	As Shown

SHRUBS / HERBACEOUS/GROUND COVER PLANTING				
Abbr.	Species	Type/Size (cm)		Centres
COS	Cornus sanguinea	3L Pot	60 - 80 cm	750
EFD	Euonymus fortunei 'Darts Blanket'	2L Pot	20 - 30 cm	500
HHG	Hedera helix 'Glacier'	1L Pot	20 - 30 cm	450
PFR	Photinia x fraseri 'Red Robin'	5L Pot	60 - 80 cm	750

HEDGE PLANTING - plant in 2 staggered rows 500mm apart at centres shown				
Abbr.	Species	%	Girth/Size (cm)	Centres
NHP	Acer campestre	10	1 + 1 Br	60 - 80 cm
	Corylus avellana	15	1 + 1 Br	60 - 80 cm
	Crataegus monogyna	35	1 + 1 Br	45 - 60 cm
	Ilex aquifolium	10	10L Pot	45 - 60 cm
	Ligustrum vulgare	15	1 + 1 Br	60 - 80 cm
	Rosa canina	5	1 + 1 Br	30 - 45 cm
	Prunus spinosa	10	1 + 1 Br	45 - 60 cm
FAS	Fagus sylvatica		2L Pot or TS 1+1	40 - 60 cm

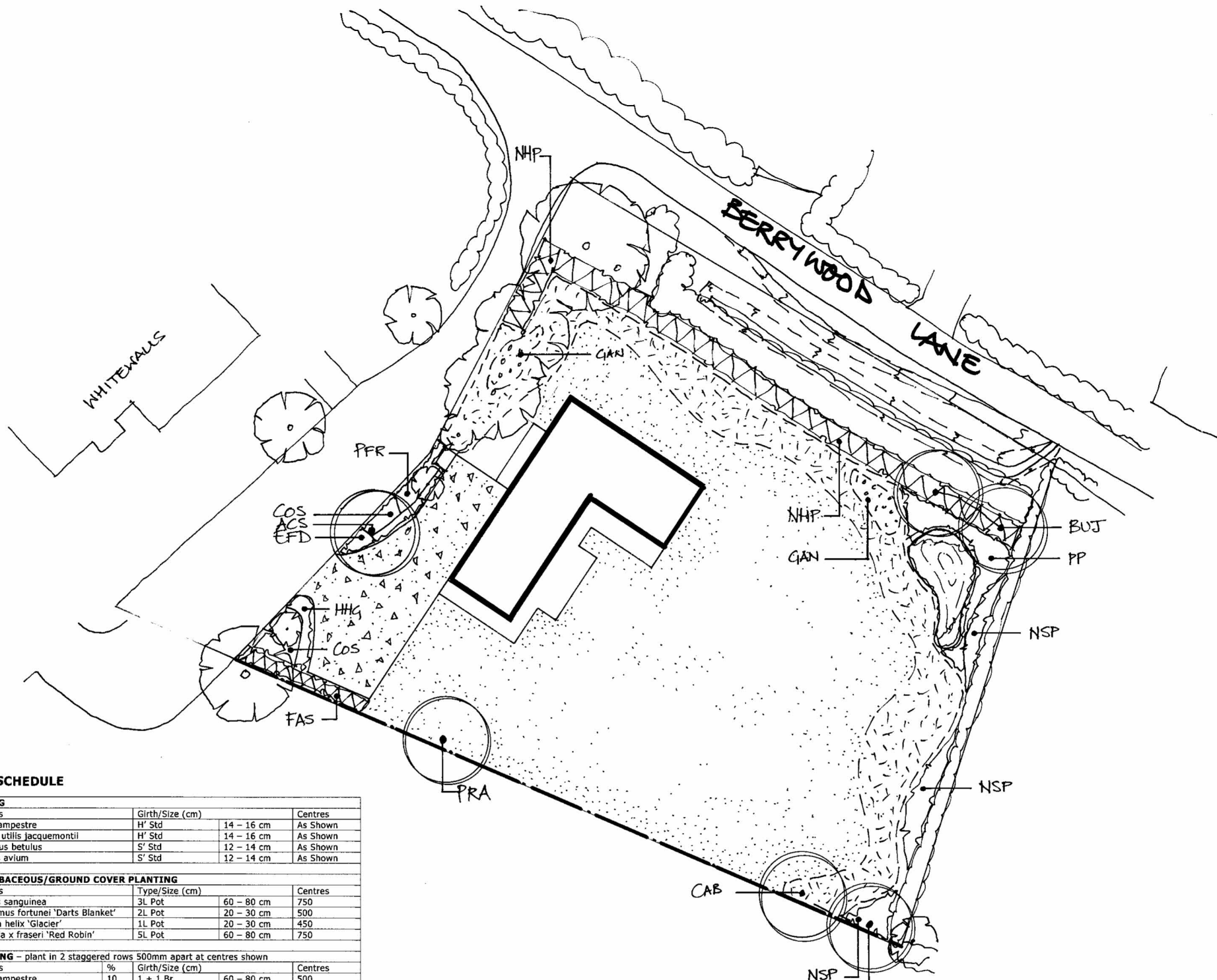
NATIVE SHRUB PLANTING				
Abbr.	Species	%	Girth/Size (cm)	Centres
NSP	Corylus avellana	20	1 + 1 Br	60 - 80 cm
	Cornus sanguinea	15	1 + 1 Br	60 - 80 cm
	Crataegus monogyna	30	1 + 1 Br	45 - 60 cm
	Rosa canina	15	1 + 1 Br	30 - 45 cm
	Prunus spinosa	20	1 + 1 Br	45 - 60 cm

BULB PLANTING			
Abbr.	Species	Size	Density
GAN	Galanthus nivalis	4 / 5	40 b/m ²

POND PLANTING - Plant as per suppliers' instructions				
Marginal Plants				
PP	Iris pseudacorus	1L Pot	Clump	500
	Lycopus europaeus	1L Pot	Clump	500
	Cardamine pratensis	1L Pot	Clump	500
	Juncus effusus	1L Pot	Clump	500
Shallow Water Plants				
PP	Butomus umbellatus	9 cm Pot	Clump	500
	Mentha aquatic	9 cm Pot	Clump	500
	Menyanthes trifoliata	BR	Clump	500
Oxygenating Plants				
PP	Ceratophyllum demersum	BR	Clump	As Shown
	Fontinalis antipyretica	Weighted	Bunch	As Shown

NOTE:

H' Std	= Heavy Standard Trees
S' Std	= Selected Standard Trees
Pot	= Container grown plants
BR	= Bare Rooted / Bagged plants
TS 1+1	= Transplant / Years



Note: This drawing remains the property of David Williams Landscape Consultancy and should not be copied without prior written consent.

Revision	Date	Initial

LEGEND

- EXISTING TREES RETAINED
- PROPOSED TREE PLANTING
- PROPOSED SHRUB / GROUND COVER PLANTING
- PROPOSED HEDGEROW PLANTING
- PROPOSED GRASSED AREAS
- PROPOSED WILDFLOWER GRASSED AREAS
- PROPOSED POST AND RAIL FENCE
- PROPOSED GRAVEL SURFACING
- PROPOSED WILDLIFE POND

Project:
PROPOSED DEVELOPMENT AT BERRYWOOD LANE, BRADLEY, ALRESFORD, HAMPSHIRE SO24 9RY

Drawing Title:
LANDSCAPE PROPOSALS PLAN

Status: **PLANNING**

Date: 12-12-2019
 Scale: 1:200 @ A1 size
 Drawing No: 1:400 @ A3 size
 Project No: **0395**
 Revision: L2

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NORTH

Appendix B – Kingspan Instructions for undertaking percolation test
Infiltration test results

TDS0005P
DRAINAGE FIELDS ALSO KNOWN AS
SUB-SURFACE IRRIGATION SYSTEMS



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All septic tank systems must have a drainage field to treat the effluent further before it enters the groundwater.

Many small package treatment units also discharge their effluent into a drainage field, primarily for liquid dispersal but also for additional effluent treatment.

The infiltration zone beneath the sub surface irrigation pipe becomes biologically active and enables additional treatment of the effluent. The unsaturated zone beneath this provides attenuation and a pathway for oxygen diffusion for further treatment. A saturated zone provides further dispersion and dilution of the treated effluent.

The siting and design of the drainage field depends on many factors, the most important of which is that there is sufficient suitable land with subsoil capable of absorbing the daily effluent discharge on a long term basis.

The UK regulators have issued documents which provides detailed guidance for planning an off mains system. **DETR Circular 3/99** (This is the same as the **Welsh Office circular 10/99**) – Planning Requirements in respect of the use of Non Mains Sewerage requires that an independent assessment of the site and land is carried out before the installation of a sewage treatment plant. Your planning consent and agreement to discharge effluent requires this assessment.

BS 6297: 2007 is a new code of practice for the design and installation of drainage fields for use in wastewater treatment. It provides recommendations and guidance to aid preliminary planning, detailed site investigation to identify suitable drainage field locations and the assessment of site characteristics. It provides systems designs and layouts including percolation testing and determination of trench area.

Site assessments must be made before equipment is purchased or installed as not all land is suitable for drainage field use. A percolation test establishes the length and area of infiltration trench required to disperse the effluent. Soil porosity can vary across a site and the percolation test should be carried out at the intended location of the proposed drainage field. It should not be carried out in extreme weather conditions such as drought frost or heavy rain.

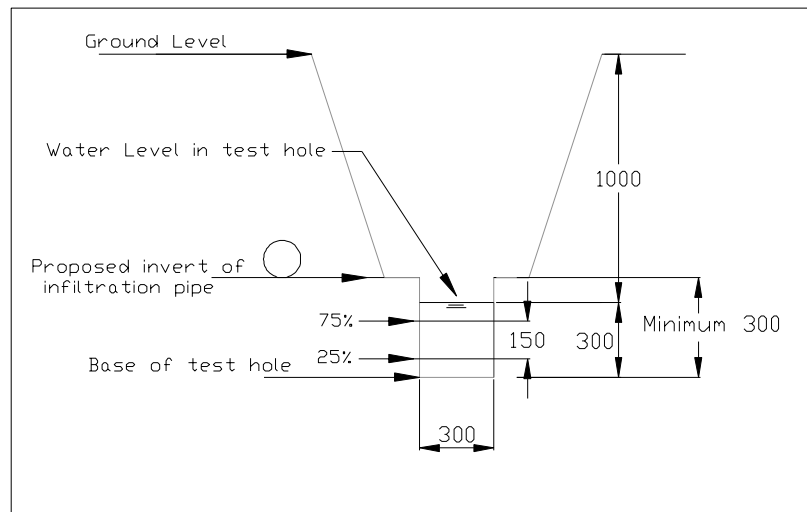
Other regulatory documents should be consulted, pollution prevention guideline no 4 (**PPG4**) and **Building regulations Part H (M in Scotland)**. However, please note that BS 6297:2007 provides the latest and most detailed percolation test method, a summary of which follows.

In order to assess the infiltration zone a percolation test is required. A deeper trial hole should be used to identify the soil and conditions beneath the drainage field, including the position of the seasonally highest water table. There should be a minimum of 1.2 m of unsaturated soil above this position.

Issue	Description	Date
02	CC694	March 2009

Percolation Test

1. Excavate at least two holes, 300 mm square to a depth at least 300 mm below the proposed invert level (bottom of the infiltration pipe), spacing them along the proposed line of the subsurface irrigation system. While digging the hole, note and record changes in soil characteristics at measured depths and the position of the water table if reached.
2. Saturate the local soil by filling each hole with water to a depth of at least 300 mm and allow this to seep away completely.
3. If the water drains rapidly, within 10 minutes, the hole should be refilled up to a maximum of 10 times. If the water continues to drain away rapidly, the ground is unsuitable.
4. If the water has not soaked away within 6 hours, the area is not suitable.
5. Determine the percolation rate by refilling each hole with water to a depth of at least 300 mm and observe the time in seconds for the water to seep away from 75% full to 25% full (i.e. a depth of 150 mm).
6. Divide this time in seconds by 150. This gives the average time in seconds required for the water to drop 1 mm.
7. Repeat the test at least three times in each hole.
8. Take the average figure from the tests to produce the percolation value V_p (in seconds).
9. Obtain the average figure for the percolation value (V_p) by summing all the values and dividing by the number of values used.
10. Retain the results, these may be required by the regulator and the property owner.
11. Where the V_p results vary widely (50% above or below the average figure), make further tests on a minimum of three different locations in the area of the proposed drainage field.
12. Drainage field disposal can only be used when percolation tests indicate average values of V_p between 15 and 100 and the preliminary assessment of the trial hole tests has been favourable.
13. The minimum value of 15 ensures that untreated effluent cannot percolate too rapidly into the ground potentially resulting in the pollution of groundwater. Where V_p is above the limit of 100, effective treatment is unlikely to take place in the drainage field as there will be inefficient soakage leading to wastewater ponding on the surface.
14. If the V_p is between one and 15, or greater than 100, the regulator should be consulted to identify alternative options for disposal.



Calculating trench area and trench length

The V_p is used to determine the total floor area of the drainage trenches and therefore the total length of irrigation drain. For domestic premises, the floor area of the drainage field required may be calculated as follows.

$$A = p \times V_p \times 0.25 \text{ for septic tanks}$$

Or

$$A = p \times V_p \times 0.20 \text{ for package wastewater treatment plants}$$

(i.e. 20 % less, because the effluent has received additional treatment)

A = required drainage field floor area in square metres (m^2).

P = number of people served by the tank (for domestic applications this should be the maximum number of people that could live in the dwelling).

V_p = percolation value.

The calculated area A should be converted to an amount of linear trench based on the width of the trench which is usually between 0.3 m to 0.9 m. The layout of the trench network will depend upon the soil porosity and the availability of land but the legs of the trenches should be connected so as to form complete loops.

Drainage field floor area (A) m ²	Floor area to linear trench length		
	Linear trench length (in metres)		
	0.3 m width trench	0.6 m width trench	0.9 m width trench
20	66	33	22
30	100	50	33
40	133	67	44
50	167	83	56
60	200	100	66
70	233	117	78
80	266	134	88
90	300	150	100

Where the calculated result indicates the need for a long drainage trench length (200 metres) serious consideration should be given to the use of a package treatment system which has been certified to produce a better quality of effluent. This effluent may, with permission, be fed into a water course or open culvert. Please contact us for further details. All equipment (for less than <50 pop equivalent) should meet the requirements of their relevant standard, i.e. EN 12566 part 1 for septic tanks, or EN 12566 part 3 for package treatment plants.

Effluent processed through a treatment plant contains far fewer pollutants and fine solids than that from a septic tank. Therefore the irrigation system is better protected and less likely to block and is smaller. The standard recognizes this fact and differentiates. As an example: Irrigation systems for domestic applications

Vp value	Population	Trench floor area: Septic tank	Trench floor area: Treatment Plant
44	6	66 m ²	53 m ²
44	8	88 m ²	71 m ²
44	10	110 m ²	88 m ²

In all cases treated effluent

- will have a lower long term impact on the site as less pollutants are discharged
- will generate fewer solids thus preserving the life of the irrigation system
- requires a smaller irrigation system which is
 - less expensive to install & easier to locate on a restricted or poorly draining site.

IRRIGATION SYSTEM DESIGN

Your recommended certified Installer should be consulted regarding the design and fabric of the drainage field for your specific site. BS 6297: 2007 provides detailed design and installation advice and advises of features influencing the position of wastewater treatment equipment and drainage fields. e.g. not closer than 7m to a building. Drainage fields should be a minimum of 10 m away from a water course or ditch. 2m away from site boundaries, away from trees and plants with extensive root systems, and from existing supply services, access roads and other drainage fields. The detailed preliminary assessment should have identified other limiting criteria such as water abstraction areas, a Site of Special Scientific Interest (SSSI) etc.

In brief, after the septic tank or treatment unit, the effluent pipe should be connected to an inspection &/or distribution chamber which leads to the drainage field. This should be designed as a closed circuit with facilities for inspection and maintenance. The layout should ensure even distribution throughout the absorption field, avoiding steep gradients on sloping sites. An inspection chamber at the furthest point from entry on each leg or loop is advisable.

The drainage / sub-surface irrigation system should be very carefully constructed using 110 mm downward facing perforated pipes laid in trenches with a uniform gradient not steeper than 1:200. The trenches should be between 300mm and 900 mm wide and minimum 1m wide strips of undisturbed ground should be maintained between parallel trenches. The pipes should be laid on a 200- 300 mm layer of clean gravel granular fill material graded either 16-32mm or 20-50mm. The trenches should be filled with the same material to a level 50mm above the pipe and covered with geotextile material to prevent the entry of silt. The remainder of the trench can be filled with normal soil. Pipes should be laid at a minimum depth of 200mm below the surface. Corrugated pipes designed specifically for land drainage should not be used.

OUR REF: R0273

17th October 2019

Mr. D Alder

c/o Foxley Tagg Planning Ltd



Dear Mr. Alder,

Land adjacent to Berrywood Lane, Bradley, SO24 9RY
Soakaway Testing

Further to completion of the soakaway testing at the above site, our letter report is as follows:

Introduction

In-situ soakaway testing has been commissioned by Foxley Tagg Planning Ltd on behalf of Mr Alder (the Client) to confirm if soakaway drainage will be suitable for a detached residential dwelling in Bradley, Alresford.

The Site

The site is located adjacent to Berrywood Lane, Bradley. The soakaway testing was carried out in two trial pits located within the north centre and south centre of the site.

According to the British Geological Survey (BGS) the site is directly underlain by the Seaford Chalk Formation of Cretaceous Age.

The Seaford Chalk Formation is described as a firm, white chalk with semi-continuous nodular and tabular flint seams.

Site Works & results of Soakaway Testing

The site work was carried out by EEGSL on 15th October 2019 and comprised of soakaway testing in two trial pits, in accordance with the methods described in BRE Digest 365⁽²⁰⁰⁷⁾.

The location of the trial pits were selected by EEGSL prior to arrival on site and considered the current proposed siting of the development. Each trial pit was excavated using a tracked excavator and both pits were taken down to an approximate depth of 1.5m (into the underlying chalk).

The trial pit details and results of soakaway testing are attached to this letter report.

As can be seen from the results of the soakaway testing, soil infiltration rates varied between the two locations. An infiltration rate of 1.65×10^{-5} was recorded within SW01 and an infiltration rate of 4.35×10^{-6} was obtained at SW02.

Conclusions

1. Based on the near surface ground conditions and results of soakaway testing, soakaway drainage is likely to be suitable in the shallow weathered Chalk strata within the area of SW01 (at a depth of 1.50mbgl).
2. It is recommended that further infiltration testing is completed once a detailed drainage design has been produced to ensure the infiltration rates required can be achieved at the specific locations on site.



----- **END OF LETTER REPORT** -----

If you have any queries, or require any further information, please do not hesitate to contact the undersigned.

Yours Sincerely,



John Grace
Regional Director
For and on behalf of Earth Environmental & Geotechnical (Southern) Ltd

Encl. Trial Pit Logs
Soakaway Test Results
Investigation Location Plan



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ENCLOSURE 1
TRIAL PIT LOGS

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend
		Depth (m)	Type	Results			
					0.20		
					0.80		
					1.50		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend
		Depth (m)	Type	Results			
					0.20		
					0.90		
					1.50		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend
		Depth (m)	Type	Results			
					0.20		
					0.90		
					1.20		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend
		Depth (m)	Type	Results			
					0.20		
					0.90		
					1.20		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend
		Depth (m)	Type	Results			
					0.20		
					0.90		
					1.20		



EARTH ENVIRONMENTAL
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ENCLOSURE 2
SOAKAWAY TEST RESULTS



SOIL INFILTRATION RATE TEST

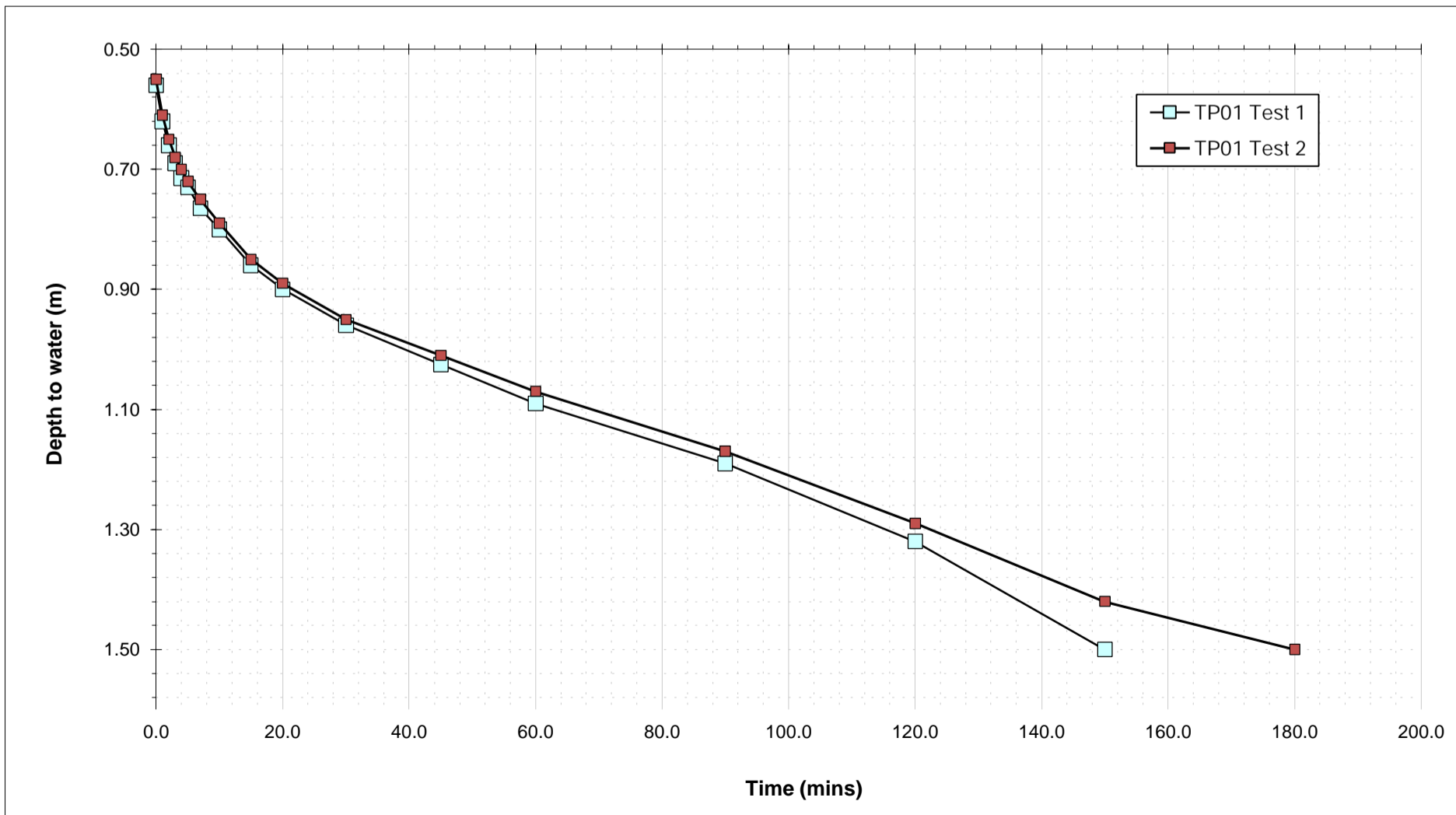
See B.R.E. Digest 365, 1991, Soakaway Design.

Site: Berrywood Lane, Bradley
 Job Number: R0273
 Client: Foxley Tagg Planning Ltd
 Date of Test: 15/10/2019

Trial Pit Number..... TP01
 Length..... 1.50 m
 Width: 0.30 m
 Depth..... 1.50 m
 Groundwater Level..... n/a m

Remarks -	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
Pit Stable	0.0	0.56	0.0	0.55	0.0	
	1.0	0.62	1.0	0.61	1.0	
	2.0	0.66	2.0	0.65	2.0	
	3.0	0.69	3.0	0.68	3.0	
	4.0	0.72	4.0	0.70	4.0	
	5.0	0.73	5.0	0.72	5.0	
	7.0	0.77	7.0	0.75	7.0	
	10	0.80	10	0.79	10	
	15	0.86	15	0.85	15	
	20	0.90	20	0.89	20	
	30	0.96	30	0.95	30	
	45	1.03	45	1.01	45	
	60	1.09	60	1.07	60	
	90	1.19	90	1.17	90	
	120	1.32	120	1.29	120	
	150	1.50	150	1.42	180	180
Effective Storage Depth	m	0.94		0.95		
75% Effective Storage Depth	m	0.71		0.71		
(i.e. depth below GL)	m	0.80		0.79		
25% Effective Storage Depth	m	0.24		0.24		
(i.e. depth below GL)	m	1.27		1.26		
Effective Storage Depth 75%-25%	m	0.47		0.48		
Time to fall to 75% effective depth	mins	10.00		10.00		
Time to fall to 25% effective depth	mins	110.00		112.00		
V (75%-25%)	m3	0.21		0.21		
a (50%)	m2	2.14		2.16		
t (75%-25%)	mins	100.00		102.00		
SOIL INFILTRATION RATE	m/s	1.65E-05				

DESIGN SOIL INFILTRATION RATE, f **1.65E-05**





SOIL INFILTRATION RATE TEST

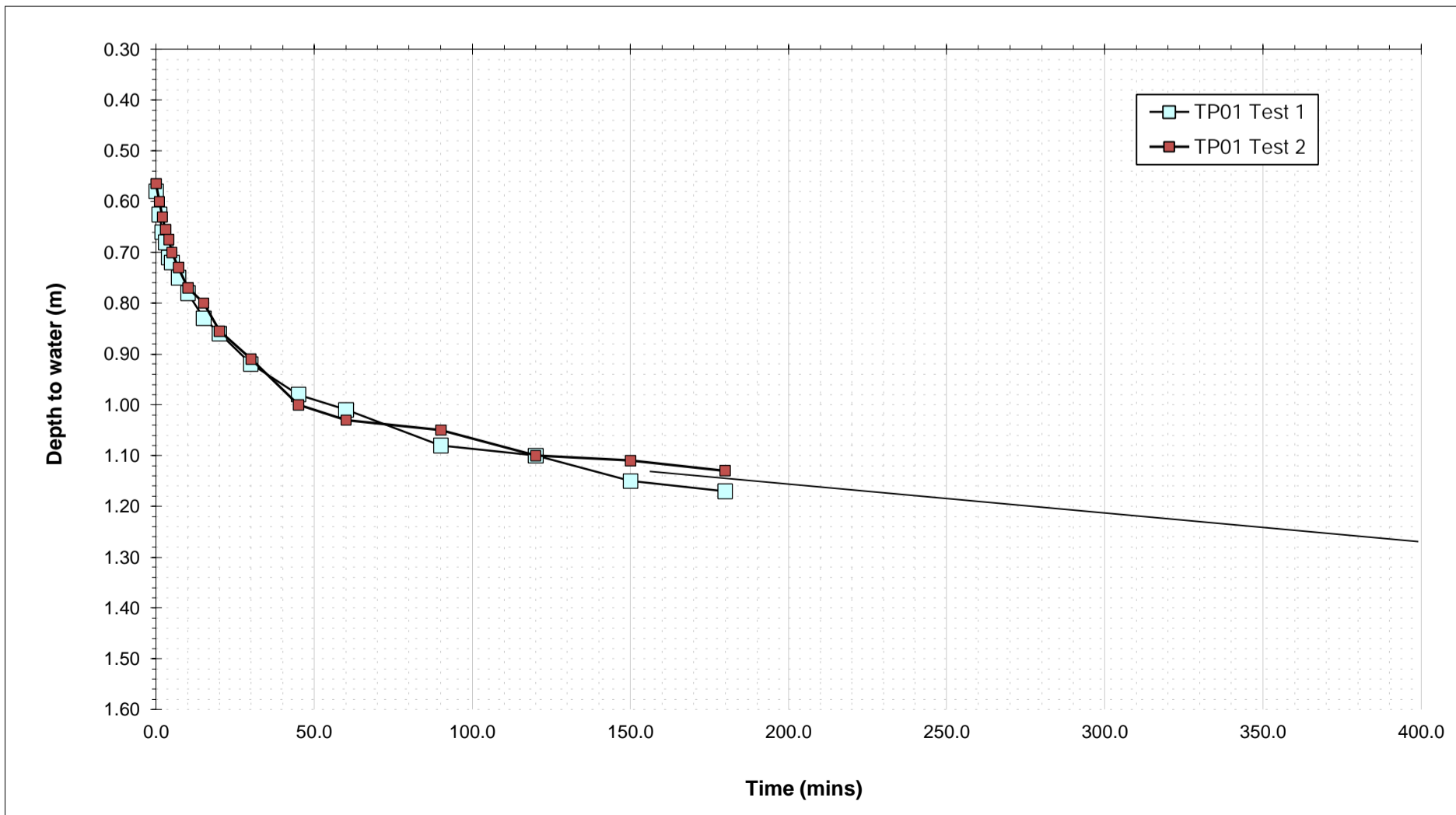
See B.R.E. Digest 365, 1991, Soakaway Design.

Site: Berrywood Lane, Bradley
 Job Number: R0273
 Client: Foxley Tagg Planning Ltd
 Date of Test: 15/10/2019

Trial Pit Number..... TP02
 Length..... 1.50 m
 Width: 0.30 m
 Depth..... 1.50 m
 Groundwater Level..... n/a m

Remarks -	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
Slow Infiltration Rate, 25% effective depth not achieved.	0.0	0.58	0.0	0.57	0.0	
	1.0	0.63	1.0	0.60	1.0	
	2.0	0.66	2.0	0.63	2.0	
	3.0	0.68	3.0	0.66	3.0	
	4.0	0.71	4.0	0.68	4.0	
	5.0	0.72	5.0	0.70	5.0	
	7.0	0.75	7.0	0.73	7.0	
	10	0.78	10	0.77	10	
	15	0.83	15	0.80	15	
	20	0.86	20	0.86	20	
	30	0.92	30	0.91	30	
	45	0.98	45	1.00	45	
	60	1.01	60	1.03	60	
	90	1.08	90	1.05	90	
	120	1.10	120	1.10	120	
	150	1.15	150	1.11	150	180
	180	1.17	180	1.13	180	
	Effective Storage Depth	m	0.92		0.94	
75% Effective Storage Depth	m	0.69		0.70		
(i.e. depth below GL)	m	0.81		0.80		
25% Effective Storage Depth	m	0.23		0.23		
(i.e. depth below GL)	m	1.27		1.27		
Effective Storage Depth 75%-25%	m	0.46		0.47		
Time to fall to 75% effective depth	mins	13.00		15.00		
Time to fall to 25% effective depth	mins	390.00		390.00		
V (75%-25%)	m3	0.21		0.21		
a (50%)	m2	2.11		2.13		
t (75%-25%)	mins	377.00		375.00		
SOIL INFILTRATION RATE	m/s	4.35E-06				

DESIGN SOIL INFILTRATION RATE, f **4.35E-06**



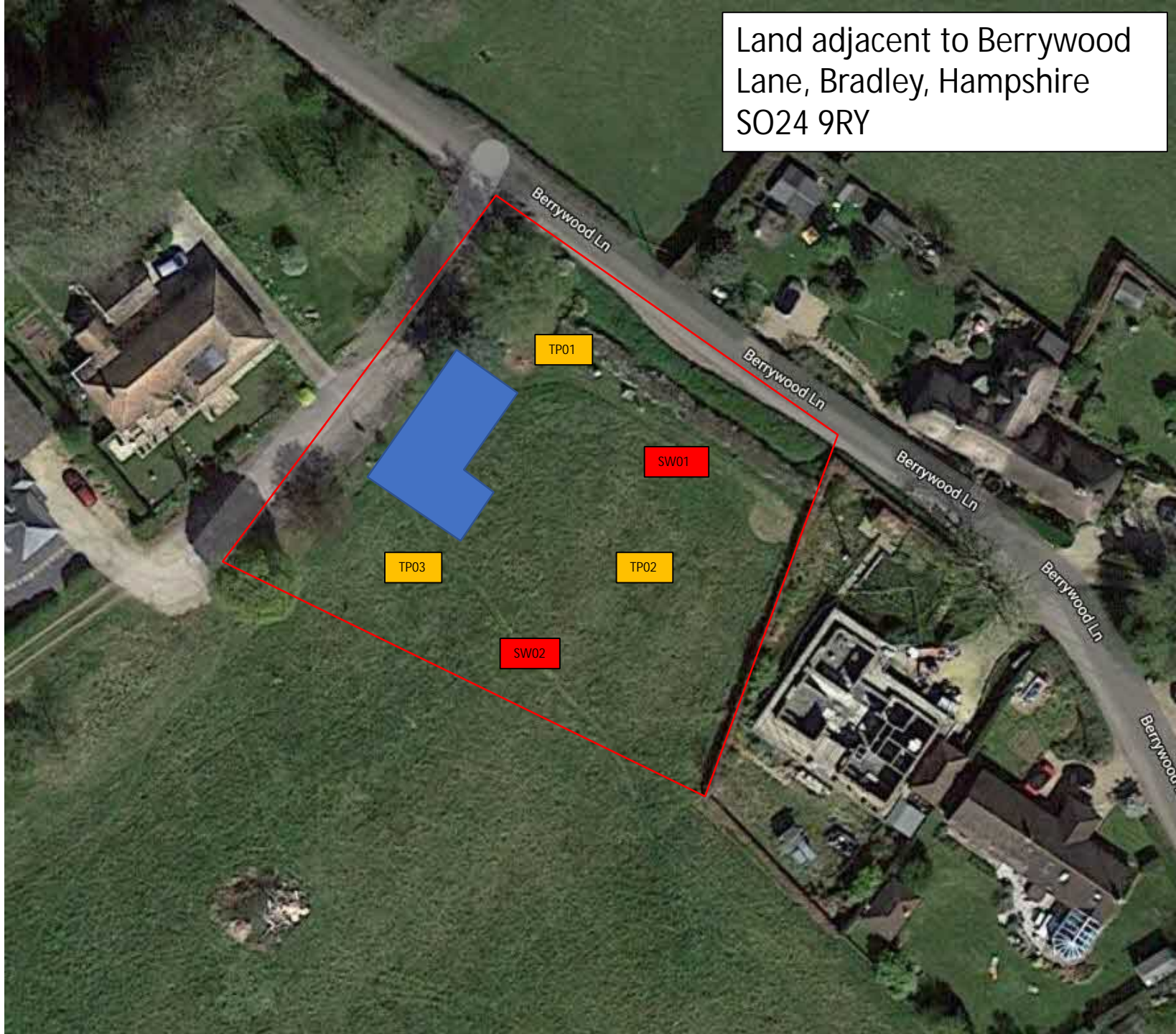


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ENCLOSURE 3

INVESTIGATION LOCATION PLAN

Land adjacent to Berrywood Lane, Bradley, Hampshire SO24 9RY



Appendix C – Kingspan Biodisc desludging procedure

IMPORTANT

Isolate power to unit before attempting any maintenance and ensure that all local procedures are complied with concerning the Health and Safety at work act.

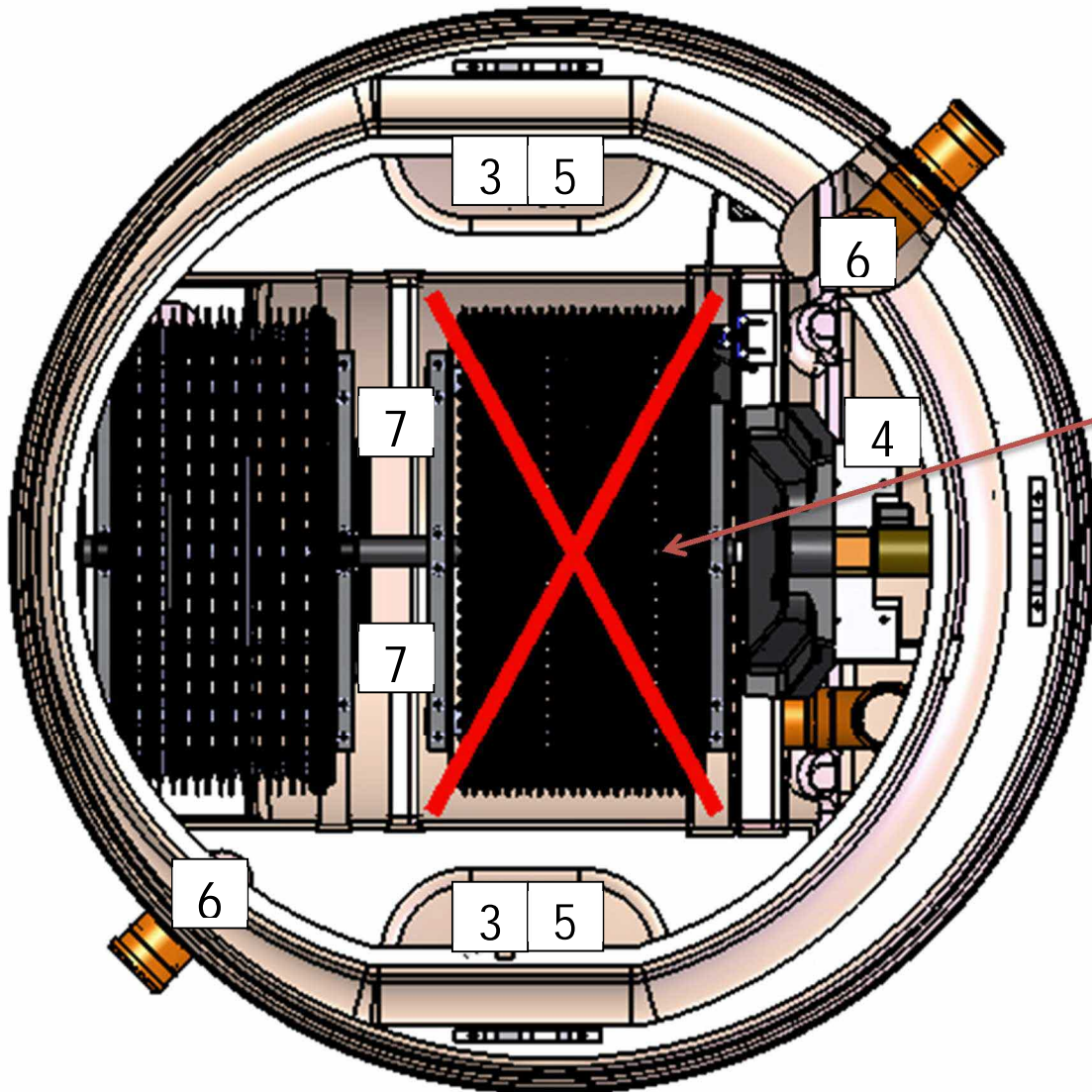
Refer to Owner's Handbook for Maintenance Details

Desludge Procedure:

1. Isolate power to unit.
2. Unlock and remove cover, taking care to avoid any damage (Standard cover weight $\approx 22\text{kg}$. Insulated split cover weight $\approx 43\text{kg}$).
3. Lower Desludge Hose into Primary tank and using the desludging holes on either side of the rotor, remove half the contents of the Primary Settlement Tank. Use the desludge holes alternatively. The liquid level in the First Stage of the Biozone will empty at the same rate as the Primary Tank, where as the Second Stage will remain full.

DO NOT remove liquor from the Biozone.

4. Lower the hose into the Final Settlement Tank, under the drive arrangement, and remove the contents. **DO NOT** attempt to remove liquid from the discharge pump chamber (if fitted).
5. Return the hose to the Primary Tank and remove the remaining material.
6. Ensure Inlet and Outlet pipes are clear of debris. Clean as necessary. Take care not to disturb the outlet pump if fitted.
7. Ensure Forward Feed buckets are clear of debris.
8. Replace and lock cover and restart unit.
9. Whilst not strictly necessary you may wish to refill firstly the Final Settlement Tank and then the Primary Settlement Tank. This action may improve the process performance.



Appendix D – Kingspan BA-BC Biodisc owners handbook

013103
OWNERS HANDBOOK
BA-BC BioDisc

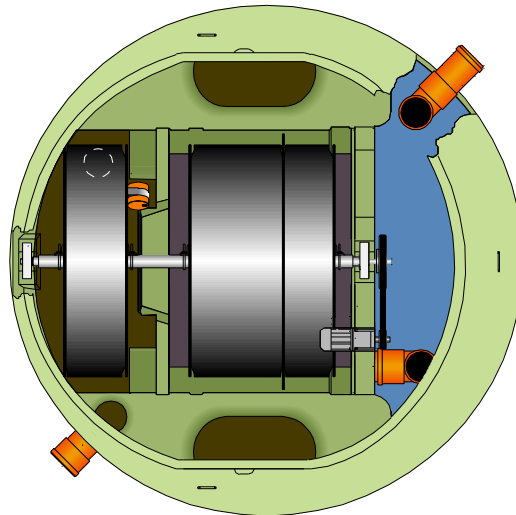


Kingspan Environmental Service Contact Numbers:

GB: 0844 846 0500

NI: 028 3025 4077

IRL: 048 3025 4077



**MANAGED FLOW
BIODISC®
BA BAX BB BC NB NC**

Issue	Description	Date
02	CC1088	September 2012

HEALTH AND SAFETY

These warnings are provided in the interest of safety. You must read them carefully before installing or using the equipment.

It is important that this document is retained with the equipment for future reference. Should the equipment be transferred to a new owner, always ensure that all relevant documents are supplied in order that the new owner can be acquainted with the functioning of the equipment and the relevant warnings. Installation should only be carried out by a suitably experienced contractor, following the guidelines supplied with the equipment.

We recommend the use of a dust mask and gloves when cutting GRP components.

A qualified electrician should carry out electrical work.

Sewage and sewage effluent can carry micro-organisms harmful to human health. Any person carrying out maintenance on the equipment should wear suitable protective clothing, including gloves. Good hygiene practice should also be observed.

Covers must be kept locked.

Observe all hazard labels and take appropriate action to avoid exposure to the risks indicated.

The correct ongoing maintenance is essential for the proper operation of the equipment. Service contracts are available and recommended. Please contact Kingspan for details of your local service provider.

Should you wish to inspect the operation of the equipment, please observe all necessary precautions, including those listed below, which apply to maintenance procedures.

BioDisc units contain rotating machinery and associated drive belts.

Ensure that you are familiar with the safe working areas and accesses.

Ensure that the working area is adequately lit.

The power supply to the equipment must be isolated at the control panel(s) before lifting the covers. Where a specific maintenance procedure requires the equipment to be running with the covers off, all care must be taken to avoid contact with moving parts and electrical components or conductors. Drive guards must be replaced and secured if removed during maintenance.

Once power has been isolated, the control panel must be kept locked shut to avoid accidental re-connection whilst work or inspection is being carried out.

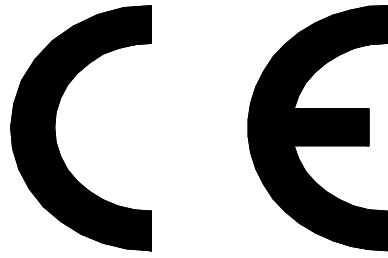
Use only the designated access walkways. Do not walk on the cover or deep well safety mesh(es).

Take care to maintain correct posture, particularly when lifting. Use appropriate lifting equipment when necessary. Keep proper footing and balance at all times. Avoid any sharp edges.

Desludging should be carried out by a licensed waste disposal contractor holding the relevant permits to transport and dispose of sewage sludge. The contractor must refer to the desludge instructions in this Handbook, a copy of the instructions are fastened under the covers.

There are separate installation guidelines available to provide full instructions for installations.

In keeping with the Company policy of continuing research and development Kingspan reserve the right to alter specifications and dimensions without notice



**Kingspan Environmental
Aston Clinton
Aylesbury
Buckinghamshire
HP22 5EW
United Kingdom**

07

EN 12566-3

BA - BF BioDisc

Hydraulic daily load:	1.2m³/day - 10m³/day
Material:	GRP Glass Reinforced Plastic
Watertightness (water test):	Pass
Structural Calculation:	Pass
Treatment efficiency:	COD: 89%
	BOD₅: 96%
	SS: 95%
	Total P: 48%
	NH₄: 89%
	Total N: 46%
Electrical consumption:	1.3 kWh/d - 3.1 kWh/d
Sludge production:	0.21 litres per person per day

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1 INTRODUCTION

- 1.1.1 Thank you for choosing a Kingspan product. This manual will help you to keep it operating efficiently over a long service life. Please read this manual thoroughly, preferably before installation.
- 1.1.2 This manual should be referred to by:
- The installer
 - The electrician
 - The service engineer
 - The maintenance engineer
 - The desludge contractor
 - The owner/user

2 TECHNICAL DATA

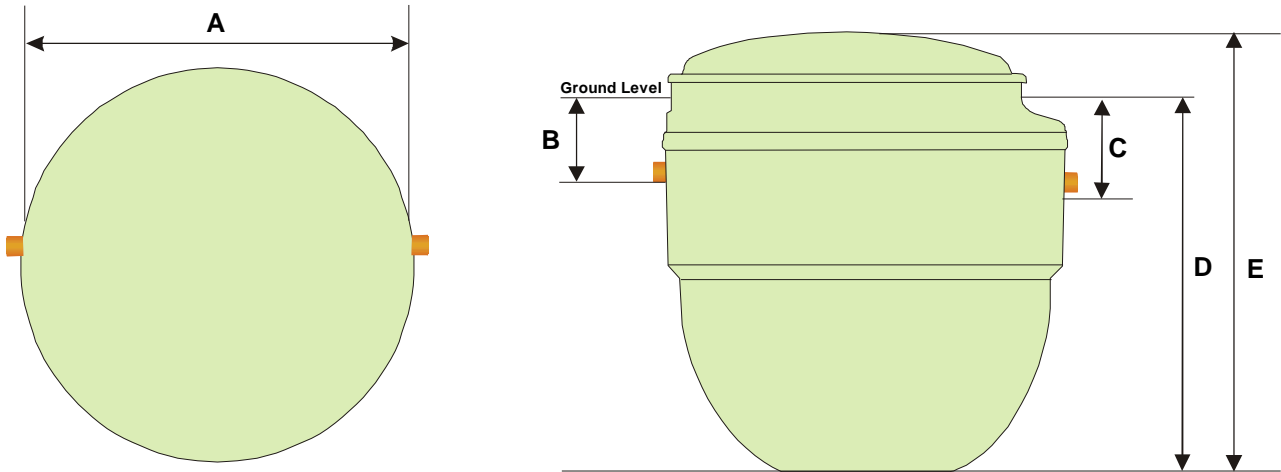


Fig. 1 General Dimensions

UNIT		BA/BAx/BB/NB			BC/NC	
Diameter	A mm	1995			2450	
Inlet Invert depth	B mm	450	750	1250	600	1100
Outlet Invert Depth	Gravity discharge	535	835	1335	685	1185
	Pumped discharge	425	425	425	N/A	N/A
Depth Below Ground	D mm	1850	2150	2650	2420	2920
O/A Height	E mm	2160	2460	2960	2825	3325
Standard Power Supply		1 phase				
Optional Power Supply		3 phase				
Drive Motor Rating	1ph/3ph	60/60 watts			75/60 watts	
Sludge Return Pump Rating	1ph	480 watts (NB only)			480 watts (NC only)	
Integral Discharge Pump*	Rating	480 watts (Not NB)			N/A	

*Optional

UNIT		BA	BAx	BB	BC
Maximum number of properties		1	1	2	Consult Kingspan
Maximum number of bedrooms		4	7	< 4 in each house	
Maximum Daily BOD	kg	0.36	0.54	0.72	1.08
Maximum Daily Flow	m ³	1.2	1.8	2.4	3.6
Peak Flow Rate **	m ³ /hr	0.15	0.22	0.30	0.45

** For ½ hour max. in any 2 hour period

- 2.1.1 All surface water must be excluded. These units should be used exclusively for the treatment of sewage from domestic properties. Contact Kingspan if your sewage results, wholly or partly, from any commercial function.

3 DESCRIPTION AND PROCESS

3.1 Introduction

- 3.1.1 BioDisc systems are designed to accept crude domestic sewage and produce an effluent of suitable quality for discharge to a watercourse or soakaway system, subject to the approval of the appropriate regulatory authority. These BioDisc's are self-contained single piece units.

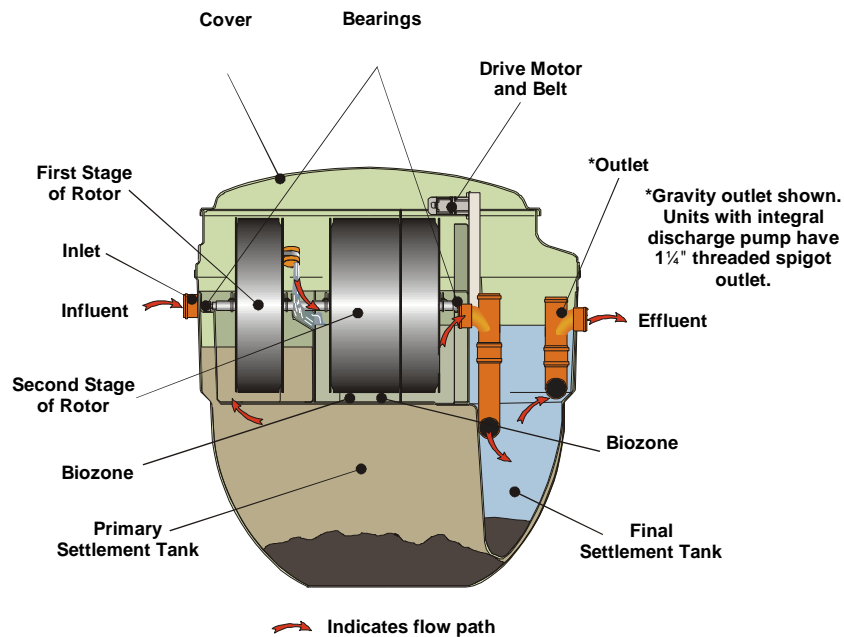


Fig. 2 - General Arrangement of BioDisc System

- 3.1.2 The main casing and cover of the BioDisc are constructed of Glass Reinforced Plastic (GRP). All steel parts are stainless, galvanised or surface coated to protect against corrosion. The discs are vacuum formed polyethylene.
- 3.2 Primary Settlement Tank**
- 3.2.1 Crude sewage enters the Primary Settlement Tank (PST), through an inlet pipe in the side of the BioDisc. Solids are settled out and retained for periodic desludging.
- 3.2.2 The PST is designed to have sufficient capacity to accept high flows over a short period and the patented Managed Flow System allows the liquid level to fluctuate to accommodate such surges.
- 3.3 Biozone**
- 3.3.1 The Biozone contains the Rotor, which consists of corrugated polyethylene discs mounted on a horizontal shaft, supported by a bearing at each end. The rotor is slowly rotated by an electric motor and reduction gearbox with a belt drive.
- 3.3.2 A flat GRP walkway along either side of the Biozone contains a number of ports which give desludge access to the Primary Settlement Tank.
- 3.3.3 The surface of the discs becomes colonised by naturally occurring micro-organisms, which form a visible coating known as the Biomass. As the discs rotate, the Biomass is alternately submerged in the settled sewage and aerated by exposure to the atmosphere. Under these conditions the Biomass can efficiently break down the pollutants in the sewage.
- 3.3.4 The Biozone and discs are divided into two stages, separated by a fixed baffle. Settled sewage enters the first stage of the Biozone through a submerged transfer slot. The liquid level in this stage will fluctuate in the same way as in the PST and the bacteria are exposed both to the fluctuating liquid level and to fluctuations in sewage strength and concentration of domestic chemicals such as washing powders. One of the functions of this stage is to minimise the effect of such shock loads, which could otherwise inhibit the process.
- 3.3.5 The second stage of the Biozone is hydraulically sealed from the first stage and maintains a constant liquid level. Liquid is transferred from the first to the second stage, at a steady rate, by a series of buckets attached to the rotor. This controlled flow of effluent is at the heart of the patented Managed Flow System, which promotes healthy and balanced growth of the micro-organisms essential for efficient treatment.
- 3.3.6 Excess Biomass (also referred to as humus) sloughs off the surface of the discs and passes with the flow, to the Final Settlement Tank.

3.4 Final Settlement Tank

- 3.4.1 The Final Settlement Tank (FST) is situated under the drive motor and receives a steady flow of treated effluent from the Biozone. The humus settles out and is retained for periodic desludging.
- 3.4.2 In NB and NC units the settled humus is periodically returned to the Primary Settlement Tank, for co-settlement, by a timer controlled pump system.
- 3.4.3 Final treated effluent discharges from the FST through a dip pipe (excepting units with an Integral Discharge Pump).

3.5 Optional Integral Discharge Pump (BA/BB only)

- 3.5.1 The discharge pump sits within a moulded chamber, positioned in the Final Settlement Tank. Treated effluent flows into the chamber, by gravity from the FST. When the liquid in the chamber reaches a pre-determined level, a float switches on the pump which then pumps effluent out of the chamber. The same float also switches off the pump when the liquid level has been sufficiently lowered, thus protecting the pump from running dry. We do recommend when this option is purchased, that a high level alarm is also fitted to warn against pump mal-operation or failure.

3.6 Control Panel

- 3.6.1 The weatherproof control panel need not be mounted next to the plant. It can be wall mounted or fixed to the mounting frame (available separately). Panel options are :
 - 3.6.1.a Standard Control Panel: (and all panels) include a 3 amp fuse which protects the motor should there be an electrical problem within the BioDisc.
 - 3.6.1.b Loss of Rotation Alarm Control Panel: This replaces the Standard Control Panel and also includes a Loss of Rotation (LOR) Alarm, which will activate if the rotor stops turning after a delay of 2-3 minutes (other than a failure in the power supply). An additional remote slave beacon may also be fitted. The loss of rotation of the rotor is sensed by a reed switch mounted near the BioDisc motor in conjunction with a magnet attached to the rotor.
 - 3.6.1.c Integral Discharge Pump Panel also includes a current overload protected supply for the discharge pump.
 - 3.6.1.d Nitrification Unit Panels contain a timer to control the operation of the sludge return pump and current overload protection for the pump motor.
- 3.6.2 All units will restart following a power cut, unless there has been a power surge greater than the pre-set limit of 3 amps.

4 INITIAL START UP PROCEDURE

4.1 Introduction

- 4.1.1 Every care is taken to ensure that all mechanical components are correctly fitted, adjusted and lubricated prior to leaving the factory. However, subsequent handling during transportation and installation may result in the movement of components and a subsequent need to re-adjust prior to starting the unit. Your installing contractor should have thoroughly checked the unit but if, on inspection, you consider that any components require adjustment, please contact Kingspan. We do recommend you purchase a Pre-service Agreement Inspection from an approved engineer.
- 4.1.2 Once the unit has been installed it should be left filled with water. Please switch on the motor, following the procedure below and leave the unit running, even if there is no sewage being fed into the plant. **If the unit has been installed with no operational power supply, then remove the motor/gearbox unit and store it in a dry or heated environment until such time as the unit is ready for permanent operation. The motor gearbox unit and drive belt should then be replaced and tensioned by Kingspan or an experienced contractor.**
- 4.1.3 We recommend that the system should be inspected. Please contact Kingspan. Where an immediate start-up is necessary, the following basic procedures should be carried out. Ensure that all Health and Safety precautions are observed.

4.2 Water

- 4.2.1 Check that the BioDisc is full of water to the outlet level.

4.3 Electrical

- 4.3.1 Check that the power supply is connected to the control panel. Check that all electrical components and conductors are earthed.

4.4 BioDisc

- 4.4.1 Check that the BioDisc is in order, with no obvious damage or misalignment of parts. If any problems are discovered, contact Kingspan.
- 4.4.2 Check that all electrical components: Drive Motor, Sludge Return Pump and LOR Alarm sensor, (where applicable) are connected to the Control Panel.
- 4.4.3 NB/NC units only: Check that the Sludge Return Timer in the BioDisc Control Panel is set correctly, as described in the installation instruction.



Fig. 3 - Pump Position

Units with optional discharge pump: Check that the pump float and associated pipework is positioned as shown and that the float can move freely.

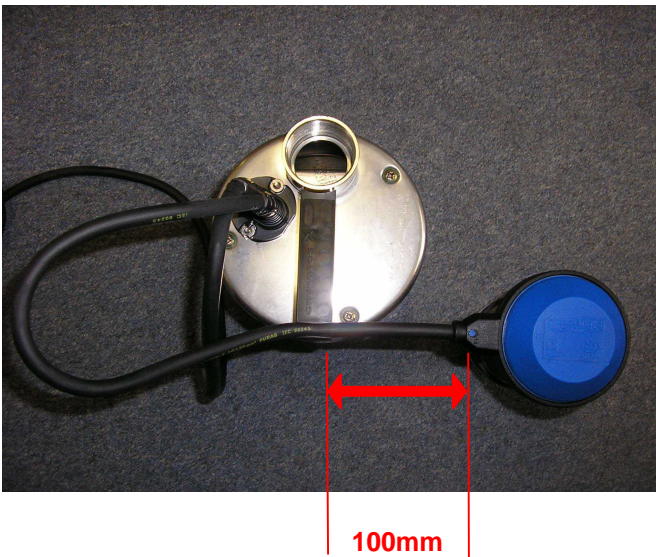


Fig. 4 - Float Setting

The float cable length is pre-set during assembly to a dimension of 100mm. Check that this dimension has not been altered. If for any reason the cable becomes disconnected from the retaining clip it should be replaced so that there is 100mm of cable between the clip and the float. Note: Setting less free cable will cause the pump to operate more frequently and may shorten its working life.

Important: With the pump chamber empty of water the float must hang clear of the chamber floor. The correct float position and distance is essential. The float must not be able to either trap or tangle, as this will prevent its correct operation. The float must not jam.

4.5 Switch On

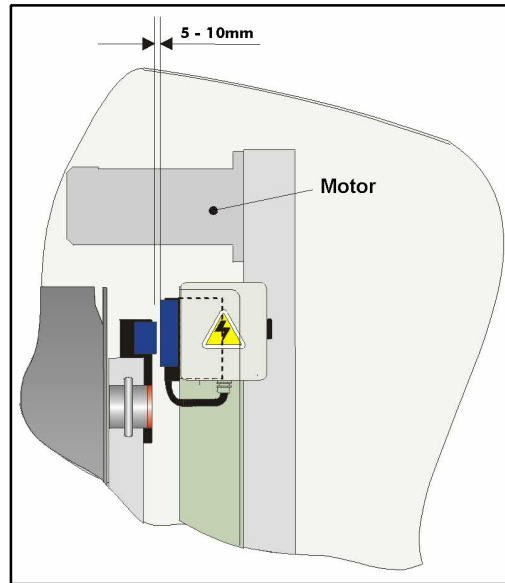
- 4.5.1 Open the Panel. Put the isolating switch into the “on” position. Close the panel. Note: If the unit is fitted with a sludge return pump, this will start immediately and will run for the pre-set period.

4.6 Running Checks

- 4.6.1 Check that the rotor is running smoothly in the correct direction of rotation and is not contacting any part of the fixed structure.
- 4.6.2 Check that the forward feed buckets are discharging correctly from the first to the second stage of the Biozone.
- 4.6.3 Units with optional Discharge pump: Once the rotor is turning, a flow through the FST and into the pump chamber will be generated. Check that the pump switches on at high level and off at low level.
- 4.6.4 **Note:** The pump switch-on level must be below the pump chamber inlet.

4.7 Optional Loss of Rotation Alarm

- 4.7.1 The alarm sensor (reed switch) is mounted adjacent to the motor/gearbox assembly. The sensor may be supplied out of position, to allow for possible minor rotor movement during transport. Check the sensor position and if necessary adjust to provide a gap of 5 - 10 mm between the sensor and the actuator magnet.



Check operation of the Loss of Rotation (LOR) Alarm as follows:

- 4.7.1.a Remove the main cover and switch off the Control Panel.
 - 4.7.1.b Remove the safety cover. At this point the display will read "F1".
 - 4.7.1.c Disconnect the cable to the motor.
 - 4.7.1.d Replace the safety cover.
 - 4.7.1.e Switch the control panel on.
 - 4.7.1.f After no more than a couple of minutes the display will read "F8".
 - 4.7.1.g Switch the panel off and remove the safety cover.
 - 4.7.1.h Reconnect the cable to the motor.
 - 4.7.1.i Replace the safety cover.
 - 4.7.1.j Switch the control panel on. The display will read "- -".
 - 4.7.1.k Press the orange reset button. The display will return to normal running mode.
 - 4.7.1.l Replace the main cover on the control panel.
- 4.7.2 Malfunctioning of the LOR Alarm does not prevent operation of the BioDisc System, but it should be reported to your maintenance engineer for early rectification.

4.8 Process Initiation

- 4.8.1 During installation, the unit will have been filled with water. Allow sewage to enter the unit, this will gradually displace the clean water used during installation.
- 4.8.2 Colonisation by micro-organisms will commence naturally and an operating biomass will develop on the discs after approx. 3-6 weeks, depending on individual site conditions and season.

5 OPERATION

5.1 Introduction

- 5.1.1 The biological treatment process of your BioDisc is self regulating and it requires no specialised operational knowledge, but it is important that you are aware of the following:
- 5.1.2 Your BioDisc system uses colonies of live natural micro-organisms (biomass), to break down the pollutants in the sewage. Many chemicals used in households and commercial establishments can inhibit or kill these micro-organisms; particularly if used in excessive amounts.
- 5.1.3 Bear in mind that treatment plants serving small populations do not have the benefit of dilution that occurs at a large sewage works. A bottle of bleach tipped down the toilet in Birmingham would be virtually lost amongst the millions of gallons of sewage arriving at the city's treatment works; a bottle of bleach in a plant serving one or two houses could be a lethal dose for the biomass.

- 5.1.4 If the biomass is damaged, it will usually recover in time. But in the meanwhile one of the more obvious symptoms may be an unpleasant smell, so it is in the operators interest to avoid this.
- 5.1.5 Generally speaking all common household cleaning fluids are acceptable, provided they are used in accordance with the manufacturers instructions and stipulated concentrations. The following "Do's and Don'ts" includes the most common household chemicals, but it is not an exhaustive list and the golden rule is "If in doubt - leave it out."
- 5.1.6 Bear in mind too that it isn't only the toilet that is connected to the treatment plant; anything that goes down the sink, bath etc., also ends up there.
- 5.1.7 During normal operation the control panel displays a single flashing red light between the two digits. During battery recharge a second red light will flash on the right of the display.

5.2 Do's and Don't's

5.2.1 Washing machine and dishwasher detergents, washing up liquids:

- 5.2.2 These are generally all right to use in the normal concentrations and usage found in domestic housing applications. Problems can occur if, for instance, you are washing the jerseys of the local rugby club's five teams!
- 5.2.3 BioDisc incorporates a unique flow management system which enhances its ability to handle shock loads of detergent waste, but there are limits even to this, so if you have to do unusual amounts of clothes washing it would be a good idea to spread it over a few days.
- 5.2.4 Excessive use of Biological washing powders can cause degradation of the biomass. Non-biological detergents, without enzymes, may be substituted.

5.2.5 Floor cleaners, disinfectants and bleaches:

- 5.2.6 These are safe to use in accordance with the makers recommendations and in the minimum necessary concentration. Do not pour neat disinfectant or bleach down sinks or outside gullies. If these are smelly it usually indicates a build up of decaying material or a plumbing problem and should be dealt with accordingly.

5.2.7 Nappy disinfectants and bottle sterilising fluids e.g. Milton

- 5.2.8 When disposing of the used fluid, ensure that it is well diluted with water. The easiest way of doing this is usually to flush it away down the toilet.

5.2.9 Waste disposal units:

- 5.2.10 These do not inhibit the biomass, but, depending on use, they can present the treatment plant with considerable extra load. This can result in the treatment process becoming unbalanced, leading to problems. Much better to compost your vegetable peelings etc - it's cheaper and environmentally friendly.

5.2.11 Home beer and wine making.

- 5.2.12 This presents a similar problem to waste disposal units. The BioDisc has to work as hard to treat one pint of beer tipped down the drain as it does to treat all the normal waste produced by one person in 24 hours. See also the notes above regarding sterilising fluids.

5.2.13 THE FOLLOWING MUST NOT BE DISCHARGED INTO THE DRAINS

- 5.2.13.a Motor oil, grease, anti-freeze, brake fluid etc.
- 5.2.13.b Cooking oil and fat.
- 5.2.13.c Weed-killers, insecticides, fungicides and other gardening chemicals.
- 5.2.13.d Paint, thinners, white spirit, turpentine, creosote etc.
- 5.2.13.e Chemical drain cleaners.
- 5.2.13.f Acid based brick/stone floor cleaners.
- 5.2.13.g Medicines
Take unused medicines to a pharmacist for safe disposal.
- 5.2.13.h Photographic developing fluids.
- 5.2.13.i Nappies, sanitary towels, rags, soft toys, tennis balls etc.
- 5.2.14 This may seem obvious, but it is amazing what gets flushed down the loo from time to time. Although such items are not directly damaging to the biomass they can cause problems, not the least of which is simple blockage of the drains.
- 5.2.15 Even so-called disposable nappies and sanitary towels often do not degrade fully in the treatment plant and can lead to malfunction, so it is best to dispose of them by other means.

5.3 Desludging and Maintenance

- 5.3.1 These are vital to the plant's ongoing operation and should be carried out in accordance with the guidelines in the maintenance section of this manual.
- 5.3.2 Maintenance contracts are available. Please contact Kingspan for your local service provider.

6 MAINTENANCE

6.1 Introduction

- 6.1.1 Kingspan BioDisc units are designed and engineered for the minimum possible maintenance requirements, consistent with proper performance. Nevertheless, it is important that routine preventive electro/mechanical maintenance and de-sludging are carried out at the appropriate intervals by suitably qualified persons.
- 6.1.2 Please contact Kingspan for your local service provider.

6.2 Customer Checks

- 6.2.1 As a back-up to routine servicing and to assist trouble-free operation, we recommend that you familiarise yourself with the operation of your BioDisc and make the following checks from time to time: (Refer to Fig. 6 for positions of parts mentioned.)
- 6.2.2 Your attention is specifically drawn to the Health and Safety section of this manual.
 - 6.2.2.a Review the appearance of the Biomass. It may be light grey to grey at the first bank, gradually changing to brown in the second stage and dark brown at the drive end of the rotor. If the growth is excessively thick and the colour predominantly grey throughout, an overload condition is indicated.
 - 6.2.2.b Visually check the general condition of the BioDisc.
 - 6.2.2.c Check that the inlet and outlet pipes (C) are clear. Remove any debris if necessary.
 - 6.2.2.d Check that the dosing bucket(s) (D) are transferring liquid consistently from the first to second biozone section.
 - 6.2.2.e Check that the buckets are clear of gross accumulations of biomass, simply clean with a water jet from a hose pipe.
 - 6.2.2.f Units with an Integral Discharge Pump: Check that the pump float can move freely and switches the pump on and off as the level in the pump chamber rises and falls. If a high level alarm is fitted check that the alarm float can move freely.
 - 6.2.2.g Familiarise yourself with the normal operating sound of your BioDisc. Report any unusual noises to your maintenance engineer.
- 6.2.3 If any malfunction is discovered, contact your maintenance engineer.

6.3 Failure of Power Supply or of Discharge Pump

- 6.3.1 BioDiscs with gravity discharge: In the event of a power failure, the control panel will show fault code "F1". Flow through the BioDisc will continue by gravity, although the quality of the discharge will gradually deteriorate. When power is re-established, check that the rotor has re-started and is turning correctly (see Section 3.0 paragraphs (5) and (6)). If the BioDisc has not been working for some time, the rotor may become unbalanced. This can cause the rotor to turn unevenly or prevent the unit restarting. In the event of any difficulties, contact your local service provider.
- 6.3.2 **Low Voltage Power Supply**
- 6.3.3 Motors may burn out if this condition is experienced. Consult electrician.

6.4 IMPORTANT - READ THIS. TAKE IMMEDIATE ACTION IF A PROBLEM ARISES

- 6.4.1 BioDiscs with pumped discharge (Integral or external pumps): During power cuts, or in the event of pump failure (indicated by fault code "F5" on the control panel), the level of sewage in the BioDisc will rise and if unchecked will lead to overflowing and/or possible damage to the motor/gearbox. At normal flow rates, sewage will reach the level of the motor in about 40 hours (6 people) or 20 hours (12 people). If pump operation cannot be re-established within this time the sewage level in the BioDisc must be carefully monitored and incoming flow restricted. If necessary the BioDisc should be emptied by a licensed waste contractor to avoid sewage overflowing the internal baffles or damaging the motor. **Do not allow the motor/gearbox to come into contact with sewage.**
- 6.4.2 *We advise that a High Level Alarm is fitted on all units with a pumped outlet. Contact Kingspan for more details.*

6.4.3 When normal operation is resumed, check for solids in the Biozone and FST and de-sludge if necessary. Check rotor rotation as above.

6.5 Sludge Removal from BioDiscs BA, BAx, BB, NB, BC AND NC.

6.5.1 Refer to the illustration below for recommended desludge positions.

(Note: Illustration is typical; individual units may vary).

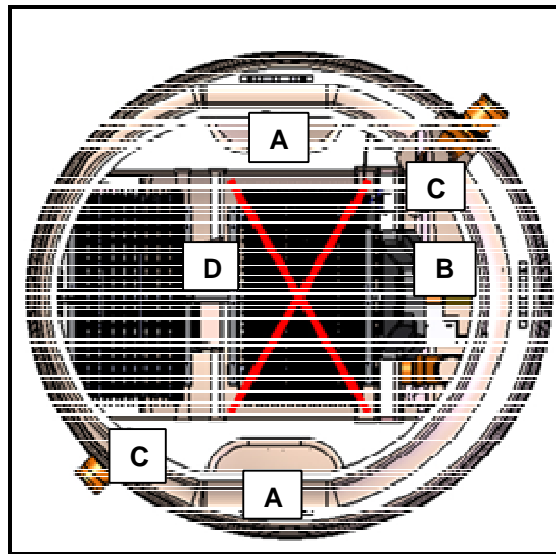


Fig. 6 - Desludge Positions

6.5.2 Isolate power to the BioDisc.

6.5.3 Undo the BioDisc cover latches and remove the cover. Hinged covers should be folded before removal.

6.5.4 Remove surface scum and about half the contents of the Primary Settlement Tank through the desludge ports [A] on either side of the rotor. Use the ports alternately. If port covers are fitted, keep the port not in use covered.

6.5.5 Empty the Final Settlement Tank [B]. **DO NOT** attempt to remove liquid from the discharge pump chamber (if fitted).

6.5.6 Remove remaining matter from the Primary Settlement tank.

6.5.7 **DO NOT** attempt to remove any liquid from the rotor section.

6.5.8 **DO NOT** attempt to clean off the gelatinous biomass growth on the rotor.

6.5.9 Ensure that the BioDisc inlet and outlet pipes [C] and the forward feed buckets [D] are free of debris. Ensure that the desludge port covers, if fitted, are replaced, then close and lock the BioDisc covers.

6.5.10 Re-connect the power supply. Ensure that the control panel door is locked shut.

6.5.11 Units with Loss of Rotation Alarms only: Wait for two minutes. If the alarm on the control panel does not activate, this indicates that the rotor has successfully re-started. If the alarm activates, switch off the power at the control panel and immediately switch on again. If the alarm continues to activate, isolate the power supply and notify the plant owner so that the problem can be investigated.

6.6 Desludge Volumes

Model	BA	BAx	BB/NB	BC/NC
Primary Settlement Tank	2200 litres (485 galls)	2200 litres (485 galls)	2200 litres (485 galls)	4580 litres (1009 galls)
Final Settlement Tank	400 litres (88 galls)	400 litres (88 galls)	400 litres (88 galls)	850 litres (187 galls)
Desludge Period	12 months Maximum	9 months Maximum	6 months Maximum	7 months Maximum

You should not exceed the maximum desludge periods given above.

7 TROUBLE SHOOTING GUIDE FOR BIODISC UNITS BA/Bax/BB/NB/BC/NC

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 Kingspan.
	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 Kingspan.
	Wiring fault	Have the wiring to control panel checked by a competent electrician. If the supply wiring is OK contact Kingspan.
	Drive belt broken	Contact Kingspan.
	Drive motor faulty	Contact Kingspan.
	Loose pulleys on rotor or gearbox output shaft	Contact Kingspan.
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 Kingspan.
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 Kingspan.
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 Kingspan or service provider. (See Section 5).

8 CONTROL PANEL FAULT CODES & FUSES

CODE	FAULT CONDITION	FUSE	Amp
F1	No power to the unit	Customer Fuse box	N/A
F3	The high level alarm has activated (where fitted)	N/A	N/A
F4	The fuse to the motor has failed	F3	3.15
F5	The fuse to the discharge pump (where fitted) has failed	F1	5.0
F6	The fuse to the chemical dosing pump has failed	F4	0.25
F7	The fuse to the recirculation pump has failed	F2	5.0
F8	The loss of rotation alarm has been activated	N/A	N/A
--	The unit has had a fault which has now corrected itself	N/A	N/A

All fuses are Time Lag HBC 20mm type.

9 WARRANTY

Taken from 'Kingspan's Terms & Conditions of Sale'

The company will replace or, at its option, properly repair without charge any goods which are found to be defective and which cause failure in normal circumstances of use within a period of twelve months from the date of delivery.

This warranty is conditional upon:

- (a) the Buyer notifying the Company of any claim within Seven days of the failure becoming discernible.
- (b) the Company being allowed a reasonable opportunity to inspect the goods so as to confirm that they are defective.
- (c) the goods not having been modified, mishandled or misused and being used strictly in accordance with any relevant instructions issued by the Company.

The Company's liability under this Clause is limited to the repair or replacement of the defective goods, and does not cover costs of transport, installation or associated site costs, if applicable.

The Company's liability to replace or repair the goods is in lieu of and excludes all other warranties and conditions, and in particular (but without limitation) the Company shall have no liability of any kind for consequential loss or damage.

For any further advice, please contact us.

A Warranty Form is included in this package, to register your unit for Warranty. Please complete ALL sections of the Form, and return it at your earliest convenience.

Also within this package is a Notice, describing the necessary maintenance of the plant in use. This should be fixed within the building.

Our service provider: Kingspan Environmental Services: 0844 846 0500

NOTICE:



KINGSPAN BioDisc®

The foul drainage from this property discharges into a package treatment works.

Maintenance is required, the frequency of which depends upon the model installed, its use and its application. Please consult your owners pack.

- * A BA BioDisc requires annual maintenance and desludging.
- * A BB BioDisc requires annual maintenance and desludging at 6 month intervals.
- * Other BioDisc models require more frequent desludging and maintenance (see individual operating manuals)

Maintenance and Desludging should be carried out by the owner in accordance with the Manufactures instructions.

THE OWNER OF THE PROPERTY IS LEGALLY RESPONSIBLE FOR ENSURING THAT THE SYSTEM DOES NOT CAUSE POLLUTION, A HEALTH HAZARD OR A NUISANCE.

We recommend that a separate log is kept of all maintenance and service visits, the log should detail the date and any action taken, e.g. Regular maintenance service, breakdown visit, desludge volume removed, parts replaced.

This notice should be fixed by the owner within the building alerting current and future owners to the maintenance requirement. (Building regulation H2 (1.57))

Please contact Kingspan Environmental Services on +44 (0) 844 846 0500 to arrange a maintenance service or to request replacement operating instructions. It would be helpful if you provide your equipment serial number.