

Phosphate Strategy Report

Rhosrobin, Wrexham

CGH-R1-0016-PHOS-02

14.03.2022







1. Background

Following National Resources Wales (NRW) new guidance intended to reduce river phosphate levels in special areas of conservation across Wales, and a guidance note advising Local Planning Authorities to complete a Habitat Regulations Assessment prior to the granting of any planning consent for any foul drainage proposal that connects to the existing adopted foul drainage network, Castle Green Homes have produced this Phosphate Strategy Report to demonstrate how phosphates can be significantly reduced, by treatment on site, before the foul water discharges from the development to a primary sewer.

2. Executive Summary

This report demonstrates that the proposed housing development, will generate a quantity of total phosphate, that will be treated on site and enter the foul wastewater network, at a level (0.3mg/l), significantly below that of the current treatment level (3mg/l) of the local wastewater treatment plant.

We acknowledge the use of such tools as the Phosphate Calculator in order to develop an initial assessment of existing phosphate levels, however Castle Green Homes have undertaken on-site water sample testing and analysis in order to attain more accurate phosphate levels that represent the current levels on site. Existing water samples were taken across the site by a Geo-Environmental Consultant and tested for phosphates by a Specialist Laboratory. Existing levels of phosphate were recorded as 0.27mg/l.

By establishing the existing phosphate levels and comparing these to proposed phosphate levels using document 'NECR170 – Advice on Nutrient Neutrality for New Development, For Local Planning Authorities – July 2020' we will show that the overall phosphate level will increase from the current 0.27mg/l to a theoretical proposed 1.41mg/l but the confirm the actual phosphate level will be 0.3mg/l as backed by Kingspan Klargester Package Treatment Plant (PTP) literature.

The wastewater would then be connected to the primary Welsh Water sewer that continues to the local Welsh Water Treatment works. All phosphate levels remain less than the treatment thresholds within the local Welsh Water treatment works (up to 3mg/l).



3. Site Description

The proposed development site is a rectangular parcel of land with a total area of 39 acres (15.78 hectares). The site comprises of 5 No. pastoral fields that are separated by a mix of post and wire fences with hedgerows and mature/semi-mature trees. It is located off the B5425 (New Road), Rhosrobin to the South, with the A483 to the East, railway to the East, with a housing development to the North. Castle Green Homes are proposing to construct 189 No. residential properties in the southern portion of the development site. The remaining area within our red line boundary will be designated as an area of public open space. Refer to Castle Green Homes Overall Site Layout drawing ref. RHRO-SP03 (Refer to Appendix).

4. Initial Foul Water Drainage Strategy

Prior to the guidance set by NRW, the foul water strategy was to discharge by gravity to an existing Welsh Water Foul sewer in the North of the development. The foul water would then be treated at the local wastewater treatment works. This was agreed with Welsh Water and a design undertaken to adoptable standards refer to Betts Associates drawing Proposed Section 104 Agreement Main Drainage Phase 1 Overview drawing ref. CGH04-BET-101 Rev E (Refer to Appendix).

5. Proposed Foul Water Drainage Strategy incorporating phosphate removal

Following the new guidance to reduce the river phosphate levels, Castle Green Homes propose the installation of an on-site treatment plant that significantly reduces the quantity of phosphates generated before the wastewater is connected into the Welsh Water Sewer system

Refer to Castle Green Homes drawing Proposed Foul Water Drainage Strategy drawing ref. SK-D-001 (Refer to Appendix).

To enable Castle Green Homes to design these systems and to record the level of treatment, we wanted to highlight the following:

- i) the phosphate level within the current scenario (prior to development)
- ii) the phosphate level following development, prior to treatment
- iii) the phosphate level following development and on-site treatment



6. Current Phosphate Levels Prior to Development.

Betts Geotechnical attended the site on 6th January 2022 and took 5No. water samples across the site. These samples were submitted to I2 Environmental Sciences to test the water samples for Total Phosphate. This analysis determines the total phosphate content of the on-site waters that are currently present, prior to any development works commencing.

The 5No. chemical analysis results show a maximum total phosphate of 270 micrograms/l which equates to **0.27mg/l**. These test results provide Castle Green with a series of baseline values for the phosphate content that is present within the water that is flowing across our development. Refer to Appendix for test results.

7. Phosphate Level Following Development Prior to Treatment

Using document 'Natural England NECR170 – Advice on Nutrient Neutrality for New Development in the Stour Catchment in Relation to Stodmarsh Designated Sites – For Local Planning Authorities – July 2020 :

Rhosrobin Development = 189No plots

Foul water discharge 120 litres per person per day

Average 2.4 persons per dwelling

Population = 189 x 2.4 = 454No

Foul Water discharge per year = 454 x 120 x 365 = 19,885,200 l/yr

0.99 Kg/year (Impact of Phosphorus inputs from small discharges on designated freshwater sites, NECR170)

454 x 0.99Kg / pp = 450 Kg TP/yr

450 Kg TP / yr x 1.2 (20% buffer) = 540 Kg TP / yr

Prior to Treatment

Phosphate Load = 540 x 10⁶ / 19,885,200 = **27.15 mg/l**



8. Phosphate Level following on site treatment

The proposal is to install a Kingspan Klargester Package Treatment Plant (PTP)

Package Treatment Plant (PTP) Total Phosphate reduction efficiency = 95%

(refer to Appendix for Kingspan Klargester PTP information sheets)

Therefore, remaining Total Phosphate following treatment = 5% = $0.05 \times 450 \text{ Kg TP/yr} = 23 \text{ Kg TP/yr}$

23×1.2 (apply 20% buffer) = 28 Kg TP / yr

Phosphate Calculation (refer to calculation on next page) = $28 \text{ Kg TP / yr} = 28 \times 10^6 \text{ mg/TP}$

Therefore, annual phosphorus load = $28 \times 10^6 / 19,885,200 \text{ litres} = \underline{\underline{1.41 \text{ mg/ litre}}}$

Kingspan Klargester treatment works offer a final phosphate level of 0.3mg/litre

Existing phosphate level from on site testing exhibits a maximum total phosphate of 0.27mg/l

The proposed drainage system will be adopted by Albion Water and maintained by Albion Water

The wastewater would then be connected to the primary Welsh Water sewer that continues to the local Welsh Water Treatment works. All phosphate levels remain less than the treatment thresholds within the local Welsh Water treatment works (up to 3mg/l).

Please refer to detailed calculation in accordance with NECR170 on the following page

Impact of Phosphorus inputs from small discharges on designated freshwater sites, NECR170

July 2020 - Final Version

Table 7 - Alternative Stage 1 methodology for package treatment plants (PTPs)



Stage 1

UNTREATED

WORKED EXAMPLE TO CALCULATE TOTAL NITROGEN (TN) AND TOTAL PHOSPHOROUS (TP)

LOAD FROM DEVELOPMENT WASTEWATER WITH ON SITE PTP (prior to treatment)

Step	Measurement	Value	Unit	Explanation
Development proposal	Development types that would increase the population served by a wastewater system	189	Residential dwellings	Development 189No plots
Step 1	Additional population	454 (189x2.4)	Persons	Based on average household size of 2.4
Step 2	TN prior to treatment Based on 3.5Kg per TN per person per year	1589	Kg TN/yr	317 (step 1) x 3.5Kg TN per person per yr (454x3.5)
	TP prior to treatment Based on 0.99Kg TP per person per year	450	Kg TP/yr	0.99Kg per person per yr (454x0.99)
Step 3	Receiving PTP TN reduction efficiency	0%		PTP efficiency rates
	Receiving PTP TP reduction efficient	0%		UNTREATED
Step 4	TN discharged after PTP treatment	1589	Kg TN/yr	
	TP discharge after PTP treatment	450	Kg TP/yr	
Step 5	Apply 20% precautionary buffer	1907	Kg TN/yr	120% of step 4 (1.2 x 1589)
		540	Kg TP/yr	(1.2 x 450)
PTP Total Nutrient Load	Nitrogen 1907 Kg TN/yr Phosphate 540 Kg TP/yr			

Natural
England
Clause 5.53

It is recommended that the TN and TP level is calculated on a per person basis. On average each person produces sewage containing 0.0035 tonnes of nitrogen per year (3.5kg) and the 0.99kg of phosphate P. The TN prior to treatment = number of additional population x 3.5kg = Kg TN/yr. The TP prior to treatment = number of additional population x 0.99Kg = Kg TP/yr

Phosphate Calculation : $540 \text{ Kg TP / yr} = 540 \times 10^6 \text{ mg / TP}$ **UNTREATED**
 Total wastewater = 454 people x 120 litres x 365 days = 19,885,200 litres
 Therefore, annual phosphorus load = $540 \times 10^6 / 19,885,200 \text{ litres} = 27.15 \text{ mg/ litre}$

Impact of Phosphorus inputs from small discharges on designated freshwater sites, NECR170

July 2020 - Final Version

Table 7 - Alternative Stage 1 methodology for package treatment plants (PTPs)



Stage 1

FOLLOWING TREATMENT

WORKED EXAMPLE TO CALCULATE TOTAL NITROGEN (TN) AND TOTAL PHOSPHOROUS (TP)

LOAD FROM DEVELOPMENT WASTEWATER WITH ON SITE PTP (prior to treatment)

Step	Measurement	Value	Unit	Explanation
Development proposal	Development types that would increase the population served by a wastewater system	189	Residential dwellings	Development 189No plots
Step 1	Additional population	454 (189x2.4)	Persons	Based on average household size of 2.4
Step 2	TN prior to treatment Based on 3.5Kg per TN per person per year	1589	Kg TN/yr	317 (step 1) x 3.5Kg TN per person per yr (454x3.5)
	TP prior to treatment Based on 0.99Kg TP per person per year	450	Kg TP/yr	0.99Kg per person per yr (454x0.99)
Step 3	Receiving PTP TN reduction efficiency	92%		PTP efficiency rates
	Receiving PTP TP reduction efficient	95%		TREATED
Step 4	TN discharged after PTP treatment	127	Kg TN/yr	8% of 1589
	TP discharge after PTP treatment	23	Kg TP/yr	5% of 450
Step 5	Apply 20% precautionary buffer	152	Kg TN/yr	120% of step 4 (1.2 x 127)
		28	Kg TP/yr	(1.2 x 23)
PTP Total Nutrient Load	Nitrogen 152 Kg TN/yr Phosphate 28 Kg TP/yr			

Natural
England
Clause 5.53

It is recommended that the TN and TP level is calculated on a per person basis. On average each person produces sewage containing 0.0035 tonnes of nitrogen per year (3.5kg) and the 0.99kg of phosphate P. The TN prior to treatment = number of additional population x 3.5kg = Kg TN/yr. The TP prior to treatment = number of additional population x 0.99Kg = Kg TP/yr

Phosphate Calculation : $28 \text{ Kg TP / yr} = 28 \times 10^6 \text{ mg / TP}$ **FOLLOWING TREATMENT**

Total wastewater = 454 people x 120 litres x 365 days = 19,885,200 litres

Therefore, annual phosphorus load = $28 \times 10^6 / 19,885,200 \text{ litres} = 1.41 \text{ mg/ litre}$



9. Phosphate Level Following Development, On-Site Treatment with Connection into Welsh Water Sewer.

Our proposal is to direct the foul drainage through a Kingspan Klargester wastewater treatment plant, designed to accommodate the discharge from a population of up to a maximum of 900 residents. The treatment plant specification details that the system significantly reduces the phosphate content, to a maximum concentration within the treated water of **0.3mg/l** total phosphate. Refer to Kingspan Water & Energy Ltd Testing Certificate within appendix.

In treating the phosphate, other contaminants within the foul water including chemical oxygen demand (COD), biological oxygen demand (BOD5), suspended solids (SS) & Ammonium (NH4) are also significantly reduced, refer to Kingspan Klargester specification datasheets for further details. Once the foul water has passed through the treatment plant, the **Phosphate level is less than the treatment thresholds within Welsh Water treatment works (up to 3mg/l).**

The resultant Total Phosphate level of 0.3mg/l post treatment of the Klargester system is therefore less than the level at which would be treated at the Welsh Water Foul Treatment Plant of 3mg/l and at a similar level of the current phosphate level of 0.27mg/l.

10. Summary

1. The phosphate level within the current scenario (prior to development) = **0.27mg/l**
The phosphate level following development, prior to treatment = **27.15mg/l**
The phosphate level following development and on-site treatment **(to Sewer)= 0.3mg/l**
2. The figures above show the total Phosphate from the treated foul water will be similar to the current scenario and significantly less than the treatment undertaken from the Welsh Water treatment works **(3mg/l).**
3. The foul water will be treated at source and the overall system will be adopted and maintained by an Ofwat approved NAV who are subject to the same requirements as Welsh Water.

We consider this proposal will provide sustainable and ecological solutions to reduce total phosphate from the proposed development to a level similar to the pre-development level.



Appendices.

- Castle Green Homes Overall Site Layout drawing ref. RHRO-SP03.
- Betts Associates drawing Proposed Section 104 Agreement Main Drainage Phase 1 Overview drawing ref. CGH04-BET-101 Rev E.
- i2 Environmental Sciences Total Phosphate Water Sample Results.
- Kingspan Water & Energy Ltd Testing Certificate.
- Correspondence from Albion Water confirming adoption of Foul Water.
- Correspondence from Kingspan confirming certification of treatment plant.
- Correspondence from Albion Water confirming procedure for adoption of treatment plant.
- Kingspan Environmental Drawings Layout 3 x Biodisc BN Ref. SK896
- Kingspan Klargester Installation and Operation Guidelines for Single Piece Units Biodisc BN
- Kingspan Balance Tanks – Installation, Operation & Electrical Guidelines – GL0331P



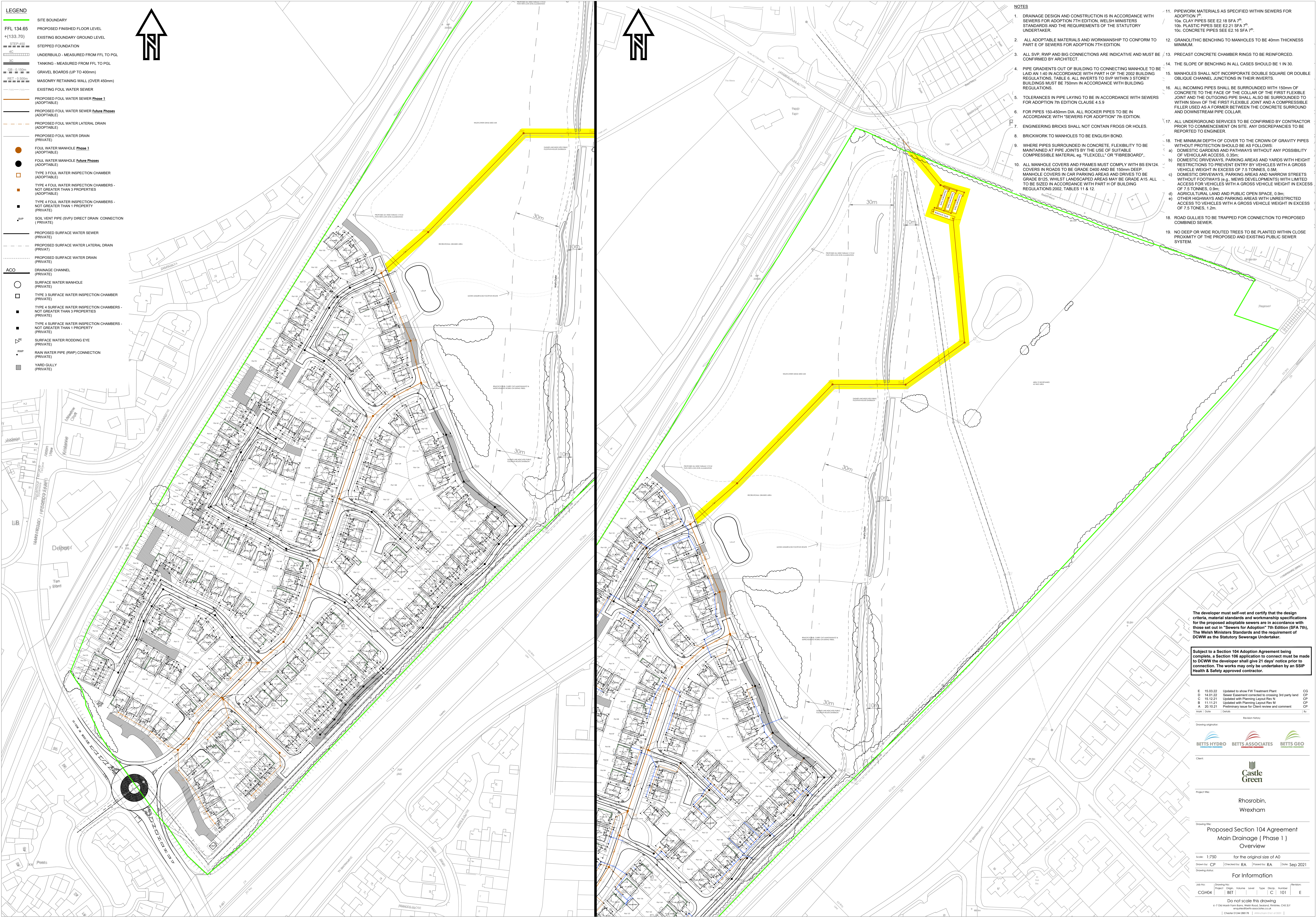
Key:
Watt's Dyke Protection fencing



Castle Green
Unit 20,
St. Asaph Business Park, St Asaph,
Denbighshire. LL17 0LJ.
Tel. 01745 536677

Rev:	Description:	Date:

Site:	Main Road, Rhosrobin, Wrexham	
Title:	Overall Site Layout	
Scale:	1:2000@A1	Date: 26.06.21
Ref:	RHRO-SP03	Rev: -





Gina Smith
Betts Geo
Old Marsh Farm
Welsh Road
Sealand
Flintshire
CH5 2LY

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

e: Geolab@betts-associates.co.uk

t: 01923 225404
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Analytical Report Number : 22-31498

Project / Site name:	Rhosrobin Wrexham	Samples received on:	07/01/2022
Your job number:	21CGL1024	Samples instructed on/ Analysis started on:	07/01/2022
Your order number:	BG4466	Analysis completed by:	11/01/2022
Report Issue Number:	1	Report issued on:	11/01/2022
Samples Analysed:	5 water samples		

Signed: *A. Czerwińska*

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



Analytical Report Number: 22-31498
Project / Site name: Rhosrobin Wrexham

Your Order No: BG4466

Lab Sample Number				2130006	2130007	2130008	2130009	2130010
Sample Reference				US1	MS1	MS2	MS3	DS1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				06/01/2022	06/01/2022	06/01/2022	06/01/2022	06/01/2022
Time Taken				0915	0950	0955	1000	1005
Analytical Parameter (Water Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

Total Phosphate as P	µg/l	20	ISO 17025	120	270	160	160	46
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U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 22-31498
Project / Site name: Rhosrobin Wrexham

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total Phosphate as P in water	Determination of ortho phosphate in water by addition of ammonium molybdate, potassium antimonyl tartrate and ascorbic acid followed by colorimetry. Accredited matrices: SW, PW, GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton, analysis by discreet analyser.	L082-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.



Certificate

353.02C02

Kingspan Water & Energy Ltd.

College Road North, Aston Clinton, Aylesbury, HP22 5EW, UK

EN 12566-3, Annex B

Small wastewater treatment systems for up to 50 PT

Small wastewater treatment system BioDisc +P

Rotating Biological Contactor (RBC) in a GRP tank with chemical dosing equipment

Test report PIA2019-353B47.02

This test certificate is a revised version of test certificate no. 353.02C01.

Nominal organic daily load (influent)	0.28 kg BOD ₅ /d		
Nominal hydraulic daily load	0.9 m ³ /d		
Material	GRP		
Treatment efficiency (nominal sequences)		Efficiency	Effluent
	COD	95.9 %	31 mg/l
	BOD ₅	98.0 %	6 mg/l
	N _{tot} *	71.1 %	17.9 mg/l
	NH ₄ -N*	92.1 %	3.0 mg/l
	P _{tot}	95.4 %	0.3 mg/l
	SS	95.6 %	15 mg/l
Electrical consumption	1.5 kWh/d		

**determined for temperatures $\geq 12^{\circ}$ C in the bioreactor*

Performance tested by:

PIA - Prüfinstitut für Abwassertechnik GmbH

Hergenrather Weg 30

52074 Aachen

Germany

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



Notified Body
No.: 1739



Martina Wermter

December 2020

Mark Fitzsimons

From: Kim Trowbridge <Kim.Trowbridge@albionwater.co.uk>
Sent: 18 January 2022 07:39
To: Mark Fitzsimons
Subject: FW: Wrexham site for proposed NAV adoption

Morning Mark

As promised yesterday – sorry for the error in the email address

Kind Regards

Kim

Kim Trowbridge
Head of Account Management
T: +44 (0)7823370099
E: kim.trowbridge@albionwater.co.uk
A: 1 Clevedon Walk, Nailsea, Bristol BS48 1WA
W: albionwater.co.uk



From: Kim Trowbridge
Sent: 14 January 2022 10:32
To: Mark.fitzsimons@castlegreenhomes.co.uk
Subject: FW: Wrexham site for proposed NAV adoption

Hi Mark

Link: <https://we.tl/t-rCodWICLBg>

Further to our recent conversations I write to confirm that Albion water would be happy to look at adopting your foul network in principle. Any final decisions would be subject to our team analysing your data, gaining a full understanding of the environment/topography of the development area and carrying out inspections throughout the build program.

From what we have seen It would appear that your design is well thought out, robust and designed to the standards expected for new development planning.

As discussed we would be more than happy to help you realise your ideas and plans regarding nutrient neutrality, water usage efficiency and environmental safeguarding. As soon as our wetlands are up and running you are welcome to come and have a look around. We can also share information on water reticulation and the Ofwat innovation project we are working on with Affinity Water.

Kind Regards

Kim

Kim Trowbridge
Head of Account Management

T: +44 (0)7823370099

E: kim.trowbridge@albionwater.co.uk

A: 1 Clevedon Walk, Nailsea, Bristol BS48 1WA

W: albionwater.co.uk



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Registered Office: Operations Centre Claverton Down Road, Claverton Down, Bath, England, BA2 7WW

Michael Ollier

From: Chris Pike <chris.pike@kingspan.com>
Sent: 04 February 2022 10:12
To: Mark Fitzsimons
Subject: RE: Large FW Treatment Plant Enquiry

Hi Mark,

As discussed the certification is for BSEN12566 which is applicable to all treatment plant up to 50PE.

There is no certification above this.

However, please note that all our BioDisc units are designed in exactly the same way using the same method so there is no reason to assume they will behave any differently.

Regards

Chris Pike

Commercial Plant Product Manager, Water BU

Kingspan Klargester

T: +44 1296 633 211 | **M:** +44 7880 093004 | **F:** +44 1296 633001

From: mark.fitzsimons@castlegreenhomes.uk <mark.fitzsimons@castlegreenhomes.uk>
Sent: 14 December 2021 09:19
To: Chris Pike <chris.pike@kingspan.com>
Subject: RE: Large FW Treatment Plant Enquiry

Hi Chris,

Do you have the installation guidelines for the units? I can only find the documents for the smaller units online.

Cheers,



Mark Fitzsimons
Design Engineer

t: 01928 240441 | m: 07508434111
w: www.castlegreenhomes.uk
a: Bridgemere House, Chester Rd, Preston Brook, Cheshire, WA7 3BD



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Registered offices at Unit 20, St Asaph Business Park, St Asaph, Denbighshire, LL17 0LJ

From: Chris Pike <chris.pike@kingspan.com>
Sent: 09 December 2021 15:14
To: Mark Fitzsimons <mark.fitzsimons@castlegreenhomes.uk>
Subject: RE: Large FW Treatment Plant Enquiry

Hi Mark,

Approx £175,000.00 plus vat.

We do not supply adoptable equipment.

Regards

Chris Pike

Commercial Plant Product Manager, Water BU

Kingspan Klargester

T: +44 1296 633 211 | M: +44 7880 093004 | F: +44 1296 633001

From: mark.fitzsimons@castlegreenhomes.uk <mark.fitzsimons@castlegreenhomes.uk>

Sent: 09 December 2021 15:11

To: Chris Pike <chris.pike@kingspan.com>

Subject: RE: Large FW Treatment Plant Enquiry

Hi Chris,

That looks perfect for our needs.

Do you have a rough budget cost for this type of system?

Also have you had any experience with these systems being adopted by Welsh Water/NAV/Local Authority?

Kind regards,



Mark Fitzsimons
Design Engineer

t: 01928 240441 | m: 07508434111

w: www.castlegreenhomes.uk

a: Bridgemere House, Chester Rd, Preston Brook, Cheshire, WA7 3BD



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From: Chris Pike <chris.pike@kingspan.com>

Sent: 09 December 2021 14:06

To: Mark Fitzsimons <mark.fitzsimons@castlegreenhomes.uk>

Subject: RE: Large FW Treatment Plant Enquiry

Hi Mark,

Thank you for your valued enquiry. Something like the attached would give 900 population. With chemical dosing on the BioDisc we can get phosphate down to 1mg/l.

Regards

Chris Pike

Commercial Plant Product Manager, Water BU



Kingspan Klargester

College Road North, Aston Clinton | Aylesbury | Buckinghamshire | HP22 5EW

T: +44 1296 633 211 | **M:** +44 7880 093004 | **F:** +44 1296 633001

E: chris.pike@kingspan.com

www.kingspanwaterandenergy.com



In accordance with GDPR, Kingspan is committed to complying with data privacy obligations in a clear and concise manner. We have updated our privacy policy which can be viewed at www.kingspanwaterandenergy.com/privacypolicy for further information.

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From: mark.fitzsimons@castlegreenhomes.uk <mark.fitzsimons@castlegreenhomes.uk>

Sent: 09 December 2021 14:01

To: Chris Pike <chris.pike@kingspan.com>

Subject: Large FW Treatment Plant Enquiry

Hi Chris,

I hope you are well.

You have assisted with the specification of suitable foul water treatment plants on a number of projects while at my previous employer HL Structural Engineers so I was hoping you might be able to help me out here at Castle Green.

We have a site in Wrexham with 189 residential units where the local planning authority won't discharge the drainage related planning condition due to the NRW guidance regarding phosphate levels entering into the watercourse that the downstream Welsh Water Treatment plant discharges to.

As you can see from the attached drainage layout, we are fortunate enough to have lots of POS which we cannot develop and permeable soil conditions where we are soaking the surface water drainage into an infiltration basin.

I was hoping we could put together a solution where we use the BioFicient Commercial Sewage Treatment Plant to treat the water and then discharge into the basin (although I'm not aware of any examples of this) or a large drainage field.

If you could give me a call to discuss that would be very much appreciated.

Kind regards,



Mark Fitzsimons
Design Engineer

t: 01928 240441 | m: 07508434111

w: www.castlegreenhomes.uk

a: Bridgemere House, Chester Rd, Preston Brook, Cheshire, WA7 3BD



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From: Kim Trowbridge <Kim.Trowbridge@albionwater.co.uk>
Sent: 07 February 2022 10:39
To: Mark Fitzsimons
Cc: Mathew Heywood
Subject: FW: Large FW Treatment Plant Enquiry
Attachments: SK896 - A.pdf; 018316-01 BN BioDisc Installation Guidelines.pdf; GL0331P-02 Balance Tank Installation Operation Electrical Guidelines.pdf

Good Morning Mark

Apologies our Operations Manager (Mat Heywood, copied in) is on annual leave for the week so hopefully my response will suffice for the time being.

I can confirm that should we agree to adopt Treatment plant we have a two track approach.

The first track is around ensuring quality, efficiency, service and safety of the plant and would flow as follows;

- During installation we will work with the team to ensure the plant is designed well, robust and fit for purpose.
- Once installed we will work in accordance with manufacturers recommendations. The attached documents are examples of the detailed advice and maintenance requirements we would adhere to. The installation and user guides are used to create check sheets for site operatives -snips from the documents below are examples of the points extracted and noted.

6.1.3 We recommend that Kingspan should commission the system: details on request.

Rotate the knob clockwise to activate the unit. **Note: Grease cartridges must be changed every 12 months.**

- Work closely and transparently with the Environment Agency to ensure the plant is compliant and all parties are comfortable and confident.
- Run effective planned maintenance programmes – again in line with manufacturer recommendations
- Continually review flow and output and treatment processes to ensure optimum performance.

The second track which runs concurrently with the first is as follows;

- We will constantly review the plant and its impact on the local environment/community.
- We will openly invite feedback from the community and wherever possible support environmental improvements in relation to the plant.
- We also use manufacturers information to help the community understand their part – for example the points below are used for community education and engagement.

- 7.1.1 The biological treatment process of your BioDisc is self-regulating and it requires no special operational knowledge, but it is important that you are aware of the following points.
- 7.1.2 Your BioDisc system uses colonies of live natural micro-organisms (biomass), to break down pollutants in the sewage. Many chemicals used in households and commercial establishments inhibit or kill these micro-organisms; particularly if used in excessive amounts.
- 7.1.3 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 was virtually lost amongst the millions of gallons of sewage arriving at the city's treatment works; a bottle of bleach in a plant serving a hotel could be a lethal dose for the biomass.
- 7.1.4 If the biomass is damaged, it will usually recover over time. But in the meanwhile one of the obvious symptoms is an unpleasant smell, so it is in the users interest to avoid this.
- 7.1.5 Generally speaking all common household cleaning fluids are acceptable, provided they are in accordance with the makers instructions and stipulated concentrations. The following "Do's 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."
- 7.1.6 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.

Lastly, our teams are highly experienced and have an extensive background in running water networks and treatment works. All have significant experience which began with working in major water companies.

I appreciate that you may need a little more technical detail so please feel free to contact Mat directly next week.

Kind Regards

Kim

Kim Trowbridge
Head of Account Management

T: +44 (0)7823370099

E: kim.trowbridge@albionwater.co.uk

A: 1 Clevedon Walk, Nailsea, Bristol BS48 1WA

W: albionwater.co.uk



From: Mark Fitzsimons <mark.fitzsimons@castlegreenhomes.uk>

Sent: 04 February 2022 10:05

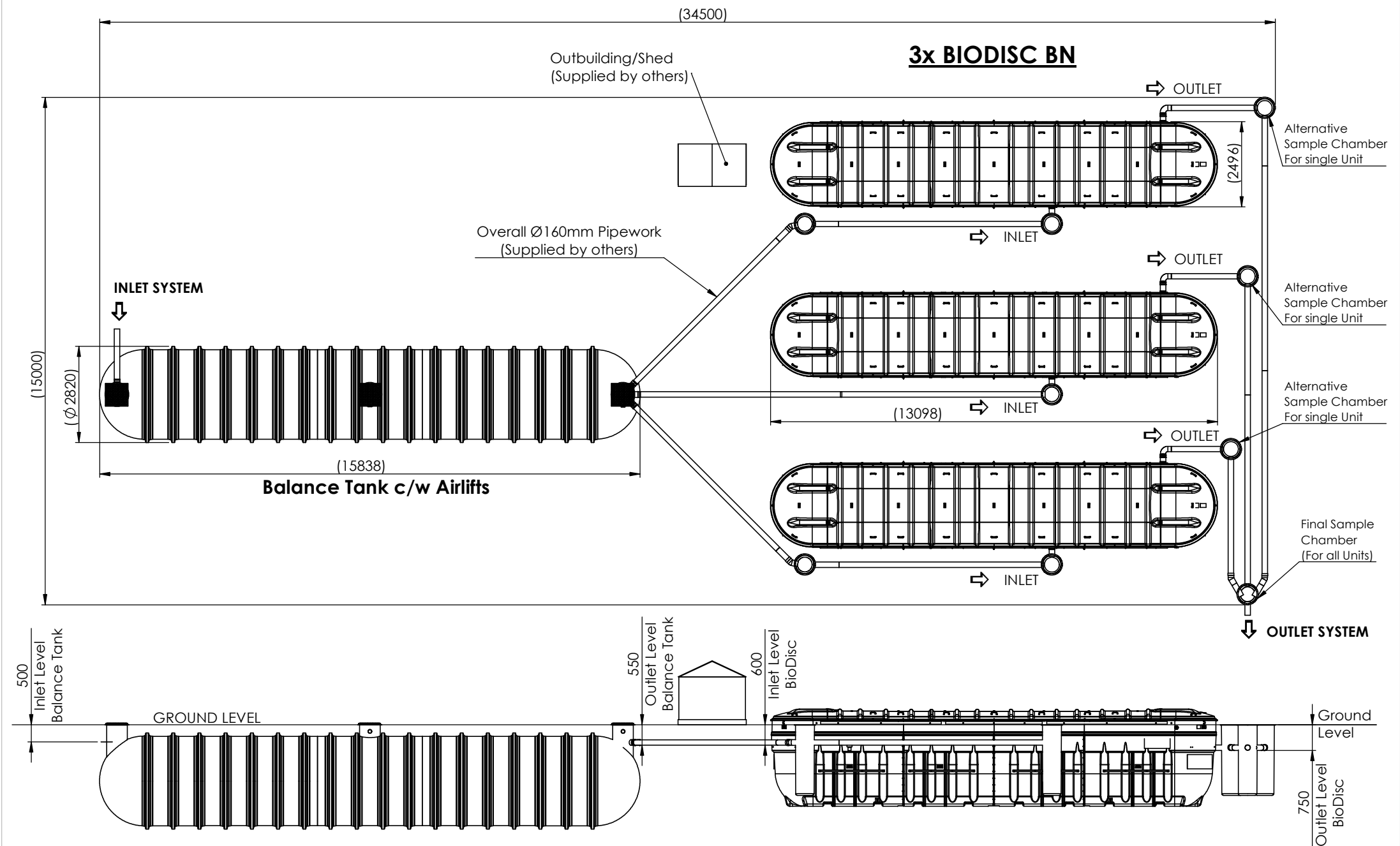
To: Kim Trowbridge <Kim.Trowbridge@albionwater.co.uk>

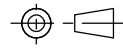
Cc: Norman Kelly <norman.kelly@castlegreenhomes.uk>

Subject: FW: Large FW Treatment Plant Enquiry

Hi Kim,

Further to our telephone conversation, could you arrange for an email or letter confirming that should our system be adopted by yourselves, it would be maintained in accordance with the manufacturer's specification and requirements?



Please Check with Kingspan Environmental For The Latest Issue Of This Drawing				
Issue	Date	Drawn by	Approved by	Description
A	17.06.19	Viaasan K		Initial Issue
All Dimensions In mm			Scale: Do Not Scale	 Third Angle Projection
Z:\Drawing Data\06 - Sketches\SK896\SK896				

Material :
 Finish :
 Weight :
 Modelled By :

Tolerance (unless stated) :
 Thickness :
 Surface Area : m²

Drawing : SK896

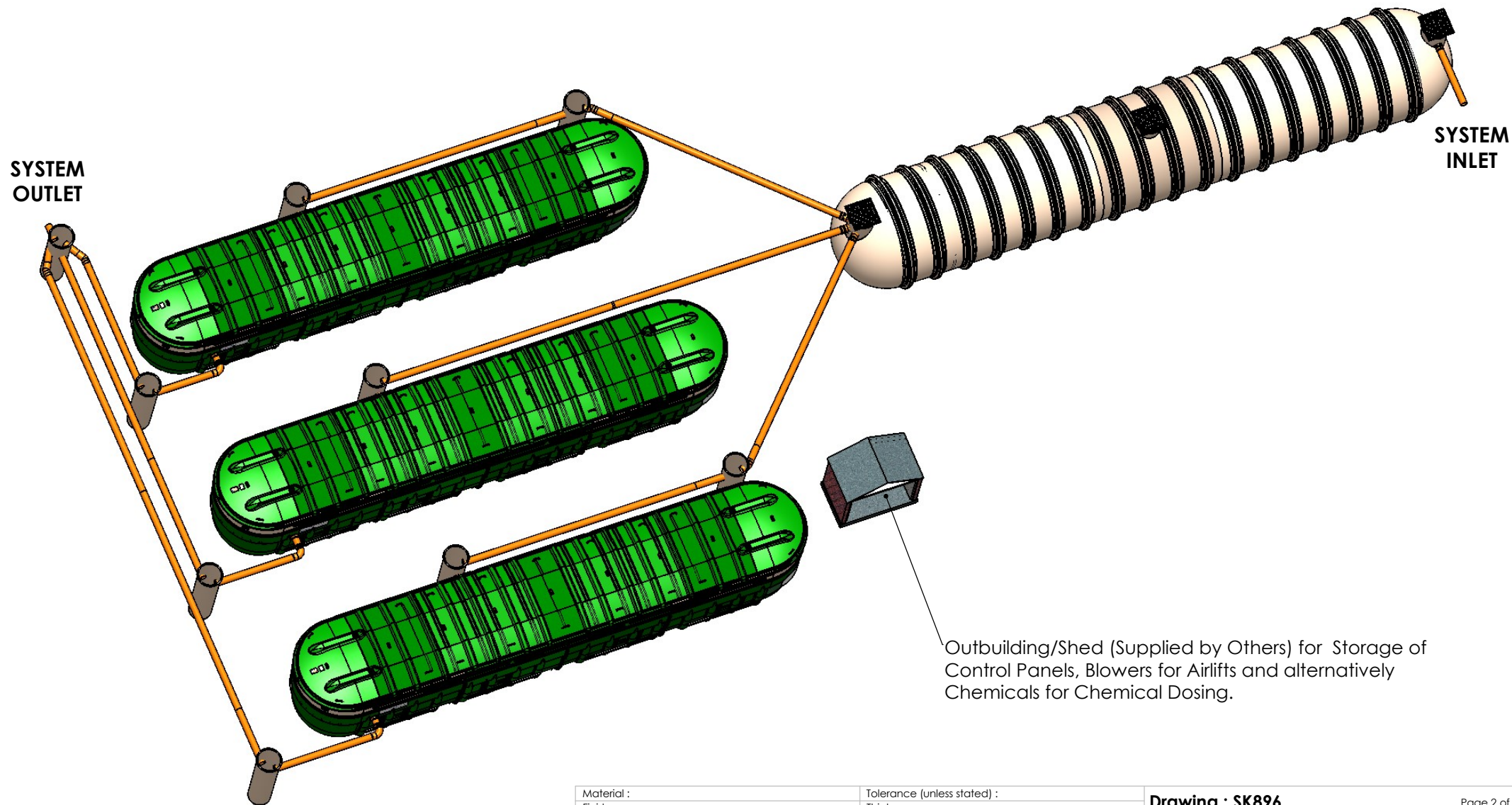
Page 1 of 2

Layout - 3x Biodisc BN

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LAYOUT - 3X BIODISC BN



Outbuilding/Shed (Supplied by Others) for Storage of Control Panels, Blowers for Airlifts and alternatively Chemicals for Chemical Dosing.

Material :	Tolerance (unless stated) :	Drawing : SK896	Page 2 of 2
Finish :	Thickness :		
Weight :	Surface Area : m ²		
Modelled By :			

018316
INSTALLATION & OPERATION
GUIDELINES FOR SINGLE PIECE UNITS
BIODISC® BN



Kingspan Environmental Service Contact Numbers:

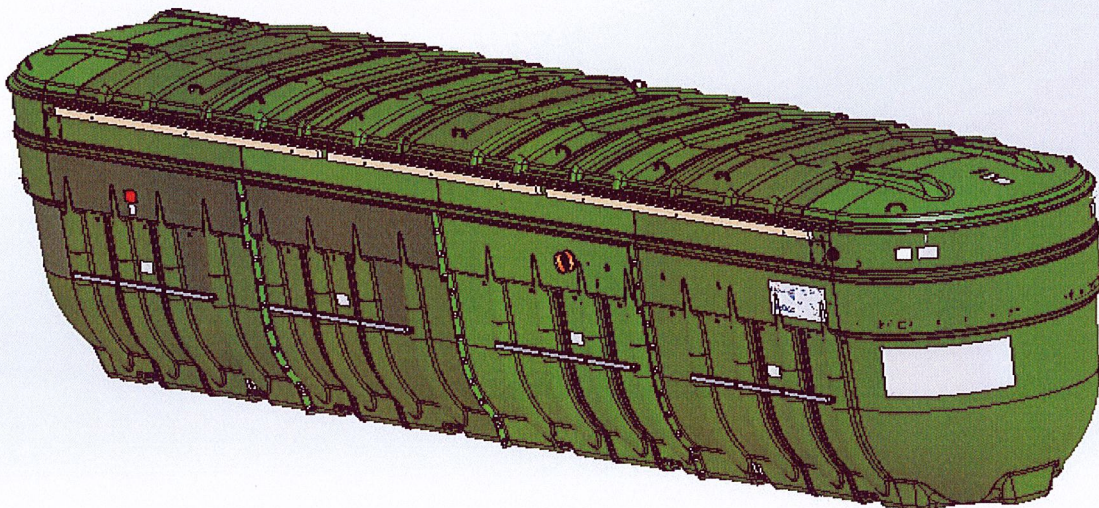
GB: 0844 846 0500

NI: 028 3025 4077

IRL: 048 3025 4077

Enclosed Documents

DS1334	BN BioDisc General Assembly – Sales Drawing
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Issue	Description	Date
01	Initial Issue – CC1392	August 2017

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.

Electrical work should be carried out by a qualified electrician.

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. Kingspan offer a range of maintenance contracts, details on request.

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 transmission equipment.

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.

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 contractor holding the relevant permits to transport and dispose of sewage sludge. The contractor must refer to the desludge instructions in the Operation section of this manual.

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1 Introduction

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.

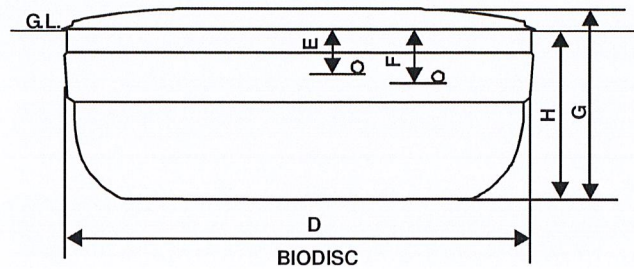
This manual should be referred to by :

- a) The installer.
- b) The electrician.
- c) The maintenance engineer.
- d) The desludge contractor.
- e) The owner/user

These Guidelines represent Best Practice for the installation of these Kingspan BioDisc Units. Many years of specialist experience has led to the successful installation of thousands of BioDisc units. It must be noted, however, that these Guidelines are necessarily of a general nature. It is the responsibility of others to verify that they are appropriate for the specific ground conditions and in-service loads of each installation. Similarly, any information or advice given by employees or agents of Kingspan regarding the design of an installation must be verified by a qualified specialist (e.g. Civil engineering consultant).

2 Technical Data

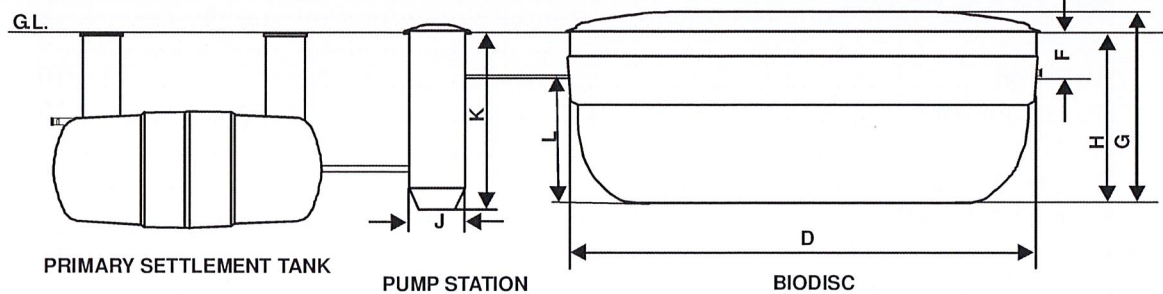
STANDARD - SINGLE PIECE SYSTEM



Note: Illustrations are schematic. Refer to General Arrangement Drawings for true pipework orientation.

OPTION - PUMP FED THREE PIECE SYSTEM

PST INLET INVERT OPTIONS - 600mm, 1100mm, 1500mm



GL = Ground Level

- 2.1.1 The loadings given below are representative of typical domestic housing applications for a discharge consent of 20/30/20. The sizing of sewage treatment plants requires specialised knowledge and experience. Please consult Kingspan for an assessment of your application.

2.1.2

Unit	BN	
PE	300	
Maximum Daily BOD (kg)	18	
Maximum Daily Flow (m³)	45	
Peak Flow Rate (m³)	7.5	
BOD (mg/l)	20	
Suspended Solids (mg/l)	30	
Ammonium NH ₄ ⁺ -N (mg/l)	20	
<u>Primary Settlement Tank</u>		
Please Refer To Klargester Sales For Applications Requiring A Primary Settlement Tank For Sizing And Dimensional Information.		
BioDisc	BN	
Inlet Invert Depth E mm	600	1000
Length D mm	13100	
Width mm	2582	
Depth Below Inlet Invert L mm	1790	
Outlet Invert Depth F mm	750	1150
Overall Height G mm	2850	3250
Height To rim cover H mm	2490	2890
Empty Weight kg	5500	5650
Standard Power Supply	400V 3 Phase	
Motor Rating 1 Phase Watts	2 x 370	
Full Load Current 3 Phase Amps	2 x 1.35	
Sludge Return Pump Rating Watts	480	
<u>Pump Station</u>		
Diameter J mm	900	
Flange Height K mm	2530	
Standard Power Supply	1ph	
Pump Rating Watts	480	

3 Handling & Storage

- 3.1.1 Care must be taken to ensure that the unit is not damaged during delivery and handling on site. If there is any damage it should be reported to the Warranty Team (0844 225 2785) within 48 hours of delivery.
- 3.1.2 The design requirements of Kingspan products will frequently mean that the centre of gravity of the unit is "offset". Care must therefore be taken to ensure that the unit is stable when lifting. Rainwater may also collect inside units, particularly if they have been stored on site prior to installation, adding weight and increasing instability. Check units before lifting and pump out any excess water.
- 3.1.3 When lifting units, use webbing slings of a suitable specification. When lifting BioDisc units the slings must be passed through the indicated channels in the base of the unit.

- 3.1.4 A suitable spreader bar should be used to ensure that the unit is stable and that loads are evenly distributed during lifting. When lifting BioDisc units the spreader bar length should be equal to the width of the BioDisc to avoid compression damage to the covers or sides of the unit.
- 3.1.5 Do not use chains. Do not use the U-bolts or horizontal beams on the BioDisc case for lifting.
- 3.1.6 Lifting equipment should be selected by taking into account the unit weight, length and the distance of lift required on site.
- 3.1.7 Kingspan Environmental accepts no responsibility for the selection of lifting equipment.
- 3.1.8 Whenever Kingspan BioDiscs are stored or moved on site, ensure that the storage location is free of rock, debris and any sharp objects, which may damage the unit. The BioDisc must be placed on ground, which is flat and level to evenly support the base of the unit.

4 Site Planning

The following points should be considered before installation of the equipment:

- 4.1.1 The discharge must have the consent of the relevant Environmental Regulator.
- 4.1.2 The installation should have Planning and Building Control approval.
- 4.1.3 Ground conditions and water table level should be assessed. If the water table will be above the base of the unit at any time of the year, adequate concrete backfill must be provided to avoid flotation. In poorly draining ground, consideration should also be given to the likelihood of flotation due to surface water collecting in the backfill. It should be borne in mind that the inlet drain trench will act as a land drain, directing surface water to the backfill around the unit.
- 4.1.4 If discharge is to a soakaway, a porosity test should be carried out in accordance with BS 6297 to assist in assessing sub-soil drainage and designing the sub-surface irrigation system.
- 4.1.5 The use of Borehole soakaways with Kingspan sewage treatment products is only acceptable when the Environment Agency discharge license allows them. Borehole soakaways are not accepted under building regs or BS6297 so it is only under special circumstances that the EA will allow such a system. Maintenance of the borehole is essential to maintain permeability.
- 4.1.6 The BioDisc system must be installed at a level, which will allow connection to the incoming drain and a free discharge at the system outlet. Effluent pumping station are available to lift the discharge to a higher level and/or pump to remote discharge points.
- 4.1.7 The unit should be installed so that the bottom lip of the cover is 65mm or more above local ground level. If the unit has to be recessed, measures must be taken to ensure that it cannot be flooded by surface water run-off.
- 4.1.8 There must be at least 1 metre of clear, level ground all around the unit to allow for routine servicing, plus adequate space to allow complete removal of the covers.
- 4.1.9 Adequate access must be provided for routine de-sludging and maintenance, including crane access. Vehicles should not be permitted within a distance equal to the depth of the unit, unless suitable structural protection is provided to the installation.
- 4.1.10 BioDisc covers are not suitable for walking on. Where necessary the BioDisc should be fenced off or otherwise protected. Maintenance access must be maintained as above.
- 4.1.11 The drainage system connected to the BioDisc must be adequately vented in accordance with the Building Regulations. The head of the drainage system should be connected to a stack pipe, open at high level, so as to draw foul air from the system and sited with consideration to prevailing wind direction. Tile vents & Air admittance valves should not be used as the sole drainage ventilation facility, but if this cannot be avoided, the BioDisc should be independently ventilated. All inspection points within the drain system should be sealed so as to enable ventilation at high level.
- 4.1.12 An adequate electrical supply must be provided, complying with current electrical regulations. The electrical details in section 2.1.1 will enable selection of suitable cable and current overload protection, taking into account the distance from the power source to the control panel and any other relevant factors. In most cases steel wire armoured (S.W.A) cable, minimum 2.5 mm² will be suitable, but this is a minimum recommendation and selection is the responsibility of the installing electrician. Although not obligatory for an installation of this type, RCD protection is suggested as an extra precaution.
- 4.1.13 Pump stations or any other associated equipment should have a separate power supply.

- 4.1.14 Proximity to a mains water hosepipe connection point is recommended, for maintenance purposes. Such a supply should be connected in accordance with water bylaws and regulations. **Never leave a hose connected and immersed in sewage.**
- 4.1.15 Installation should only be carried out by suitably qualified and experienced contractors in accordance with the Health and Safety at Work Act. Electrical work should be carried out by a qualified electrician, working to the latest edition of IEE.

5 Installation

5.1 General

- 5.1.1 When units are installed in unstable ground conditions where movement of the surrounding material and/or unit may occur, the connecting pipe work should be designed to minimise the risk of damage from differential movement of the unit(s) and/or surrounding material.
- 5.1.2 In situations where the excavation will not maintain a vertical wall, it will be necessary to support sidewalls of the excavation (E.g. with suitable trench sheets and bracing systems) to maintain a vertical wall from the bottom to the top of the excavation. **DO NOT** completely remove the shoring system until after the backfilling is complete, but before the concrete fully hardens.
- 5.1.3 In areas where the water table is above the bottom of the excavation and/or the excavation is liable to flood, the excavation should be de-watered, using suitable pumping equipment, until the installation is complete. In such conditions it may be advisable to line the excavation with polythene sheeting, to prevent cement being washed out of the concrete surround/base.
- 5.1.4 During installation care must be taken to ensure that the body of the unit is uniformly supported so that point loads through the unit are avoided.
- 5.1.5 Refer to the drawings attached for dimensions of units.
- 5.1.6 The Concrete Specification is not a site-specific installation design.

GENERAL CONCRETE SPECIFICATION IN ACCORDANCE WITH BS EN 206-1 (BS 8500-1)		
TYPE OF MIX		(DC) DESIGN
PERMITTED TYPE OF CEMENT		BS 12 (OPC): BS 12 (RHPC): BS 4027 (SRPC)
PERMITTED TYPE OF AGGREGATE ((coarse & fine)		BS 882
NOMINAL MAXIMUM SIZE OF AGGREGATE		20 mm
GRADES: C25 /30 C25 /30 C16 /20		REINFORCED & ABOVE GROUND WITH HOLDING DOWN BOLTS REINFORCED (EG. FOR HIGH WATER TABLE) UNREINFORCED (NORMAL CONDITIONS)
MINIMUM CEMENT CONTENT	C30 C20	270 - 280 Kg/M ³ 220 - 230 Kg/M ³
SLUMP CLASS		S1 (25mm)
RATE OF SAMPLING		READY MIX CONCRETE SHOULD BE SUPPLIED COMPLETE WITH APPROPRIATE DELIVERY TICKET IN ACCORDANCE WITH BS EN 12350-1
NOTE: STANDARD MIXES SHOULD NOT BE USED WHERE SULPHATES OR OTHER AGGRESSIVE CHEMICALS EXIST IN GROUND WATER		

5.2 BioDisc Installation

- 5.2.1 Excavate a hole of sufficient length and width to accommodate the unit and a minimum of 200mm concrete surround and to a depth, which allows for the burial depth of the unit plus a minimum 300mm thick concrete base.
- 5.2.2 Construct a suitable concrete base slab, a minimum of 300mm thick, appropriate to site conditions. In wet or unstable ground conditions it may be necessary to lay a hard-core sub-base. Ensure that the slab is flat and level. Allow the slab to set sufficiently to support the installed load.
- 5.2.3 Ensure that the slab is free of any stones or other material, which could damage the unit. Lower the unit onto the slab using suitable webbing slings and lifting equipment.
- 5.2.4 Remove the package tied to the outside of the unit. This contains a copy of the Installation Guidelines and a cover key.
- 5.2.5 Remove the covers by undoing the locks and folding the end covers back over the inner covers before lifting them off. Then unlock and remove the centre covers.

- 5.2.6 Remove the Control Panel, from the walkway inside the unit.
- 5.2.7 Check that the inlet and outlet orientation is correct and that the unit is level. It is essential that the unit is installed in a level plane to avoid undue stress on the bearings. The unit must be level to within $\pm 5\text{mm}$ from side to side, measured at the walkway on either side of the rotor. If necessary, lift the unit off the base and apply further concrete as needed to level up.
- Note: The top flange of the BioDisc should not be used for levelling as manufacturing tolerances may result in it not being parallel with the rotor shaft.**
- 5.2.8 It is essential that the unit levels are checked regularly throughout the installation process. Should the unit become out of level, immediate remedial action is advised, to maintain the unit within the levels stated in section 5.2.7.
- 5.2.9 Pour no more than 1 metre depth of water into both primary (inlet) chambers and the final (outlet) chamber ensuring that there is never more than 250mm difference in water level between any of the sections.
- 5.2.10 Place concrete backfill to approximately 500mm depth around the unit ensuring good compaction to avoid voids. **Do not use vibrating pokers.**
- 5.2.11 Continue backfilling with concrete to just below the level of the inlet spigot. Keep the concrete at an even level all round the unit, compacting in layers. As backfilling progresses keep the ballast water level inside the unit 250-500mm above the concrete backfill level, but do not attempt to fill the unit with water above the outlet level.
- 5.2.12 Remove blanking cap from the cable duct at the outlet end of the unit.
- 5.2.13 Continue to backfill, with concrete or free flowing granular material, up to ground level. **Do not use sand.** The finished surface should be 65 mm minimum lower than the lip of the cover.

Important: Refer to Front Page regarding delayed electrical installation.

5.3 Control Panel – Installation

- 5.3.1 The control panel is supplied fixed to the pedestrian walkway at the outlet end of the unit, cut cable ties to remove.
- 5.3.2 The control panel is suitable for internal or external wall mounting, with volt-free contacts for an optional beacon or telemetry. Kiosks are available as an option on request.
- 5.3.3 It is important that the control panel is situated in an accessible location for servicing and maintenance.
- 5.3.4 The panel key is in the protective bag on the front of the panel.

5.4 Control Panel - Connection

- 5.4.1 It is necessary to supply (by others) SWA cable to connect the control panel with the internal junction box inside the unit.
- 5.4.2 The gearbox, loss of rotation alarm and sludge return pump are all pre-wired into the internal junction box within the unit.
- 5.4.3 The SWA cable connecting the control panel and internal junction box must be ducted through the 4" port at the outlet end of the unit.
- 5.4.4 Refer to the wiring diagram inside the panel for connection details.

5.5 Ancillary Equipment

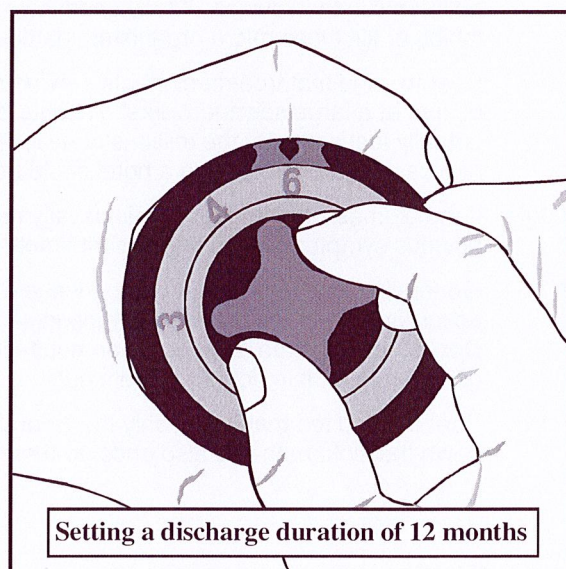
- 5.5.1 Ancillary items should be installed in accordance with the Installation Guide supplied e.g.
- Primary Settlement Tank
 - Sewage Pump Station
 - Effluent Pump Station
 - Sample Chamber
 - Grease Trap

6 Start Up

- 6.1.1 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. If, on inspection, you consider that any components require adjustment, please contact Kingspan.
- 6.1.2 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.** Kingspan or an experienced contractor should then replace the motor gearbox unit.
- 6.1.3 We recommend that Kingspan should commission the system: details on request.
- 6.1.4 Where circumstances dictate an immediate start-up the following basic procedures should be carried out.
- 6.1.5 Check that the Primary Settlement Tank (where applicable) and the BioDisc are full of water to their outlet levels.
- 6.1.6 Check that the power supply is connected to the control panel. Check that all electrical components and conductors are earthed.

6.2 Automatic grease cartridges

- 6.2.1 The shaft roller bearings are fitted with pressurised grease cartridges. These should be activated before the unit is started.
- 6.2.2 Turn the control knob and it's linked dial until the figure 6 is against the arrow on the casing, as opposite (this will give a lubrication period of 12 months at the temperature in the BioDisc).
- 6.2.3 Depress the red button. This secures the setting and releases the control knob from dial.
- 6.2.4 Rotate the knob clockwise to activate the unit. **Note: Grease cartridges must be changed every 12 months.**



6.3 Optional Pump Station

- 6.3.1 Check that the pumps have been installed and wired to the Pump Control Panel.
- 6.3.2 The pumps should be set to pump little and often in order to prevent excessive loading on the BioDisc.
- 6.3.3 Check the setting of the high level float in the pump chamber. This must be set to operate the pumps so as not to exceed the balancing volume of the unit. To ensure this the float must operate below the level of the inlet of the unit. Ensure that the float(s) can operate freely without risk of entanglement. Check that the Pump Control Panel timer is set correctly, as shown on the wiring diagram.

6.4 BioDisc

- 6.4.1 Check that the BioDisc is in order, with no obvious damage or misalignment of parts. If any possible problems are discovered, contact Kingspan.
- 6.4.2 Check that all electrical components: Drive Motors, Sludge Return Pump and LOR Alarm sensors, are connected to the Control Panel.
- 6.4.3 Check that the Sludge Return Timer in the BioDisc Control Panel is set correctly, as indicated on the wiring diagram.

6.5 Switch-on

- 6.5.1 Open the BioDisc control panel, check that all circuit breakers are in the “on” position and switch on the main isolator switch. Close and lock the panel. Immediately upon switching on the sludge return pump should start and run for the set time.
- 6.5.2 Open the Pump Control Panel (where installed), check that all circuit breakers are in the “on” position and switch on the main isolator switch. Close and lock the panel. Immediately upon switching on the isolator, one of the pumps may start and run for the set time.

6.6 Process Initiation

- 6.6.1 During installation, the unit will have been filled with water to prevent flotation in the concrete surround. Allow sewage to enter the unit, this will gradually displace the clean water used during installation.
- 6.6.2 The colonisation by micro-organisms will commence naturally and a full operating biomass will establish itself on the discs in 4-8 weeks, depending on individual site circumstances.

7 Operation

- 7.1.1 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 points.
- 7.1.2 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.
- 7.1.3 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 a hotel could be a lethal dose for the biomass.
- 7.1.4 If the biomass is damaged, it will usually recover over time. But in the meanwhile one of the more obvious symptoms is an unpleasant smell, so it is in the users interest to avoid this.
- 7.1.5 Generally speaking all common household cleaning fluids are acceptable, provided they are used in accordance with the makers 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.”
- 7.1.6 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.

7.2 Do's and Don'ts

7.2.1 **Washing machine and dishwasher detergents, washing up liquids:**

These are generally all right to use in the normal concentrations and usage found in domestic housing applications. All commercial applications are individually assessed before installation for their laundry load. Please contact Kingspan for advice if any changes are contemplated e.g. addition of extra laundry facilities.

7.2.2 **Floor cleaners, disinfectants and bleaches:**

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.

7.2.3 **Nappy disinfectants and bottle sterilising fluids E.g. Milton:**

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.

7.2.4 **Waste disposal units:**

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 - its cheaper and environmentally friendly.

7.2.5 **Home beer and wine making.**

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.

7.2.6 **THE FOLLOWING MUST NOT BE DISCHARGED INTO THE DRAINS**

- **Motor oil, grease, anti-freeze, brake fluid etc.**
- **Cooking oil and fat.**
- **Weed-killers, insecticides, fungicides and other gardening chemicals.**
- **Paint, thinners, white spirit, turpentine, creosote etc.**
- **Medicines.** Take unused medicines to a pharmacist for safe disposal.
- **Photographic developing fluids.**
- **Nappies, sanitary towels, rags, soft toys, tennis balls etc.**

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.

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.

7.3 Automatic Restart

- 7.3.1 BioDiscs are designed to re-start automatically when power is resumed, but the re-start may not succeed in some circumstances, such as extended power cuts. This will cause the alarm to activate when power is re-established after power cuts, check that the rotor is turning correctly. In the event of any difficulties, contact Kingspan.

8 Running Checks

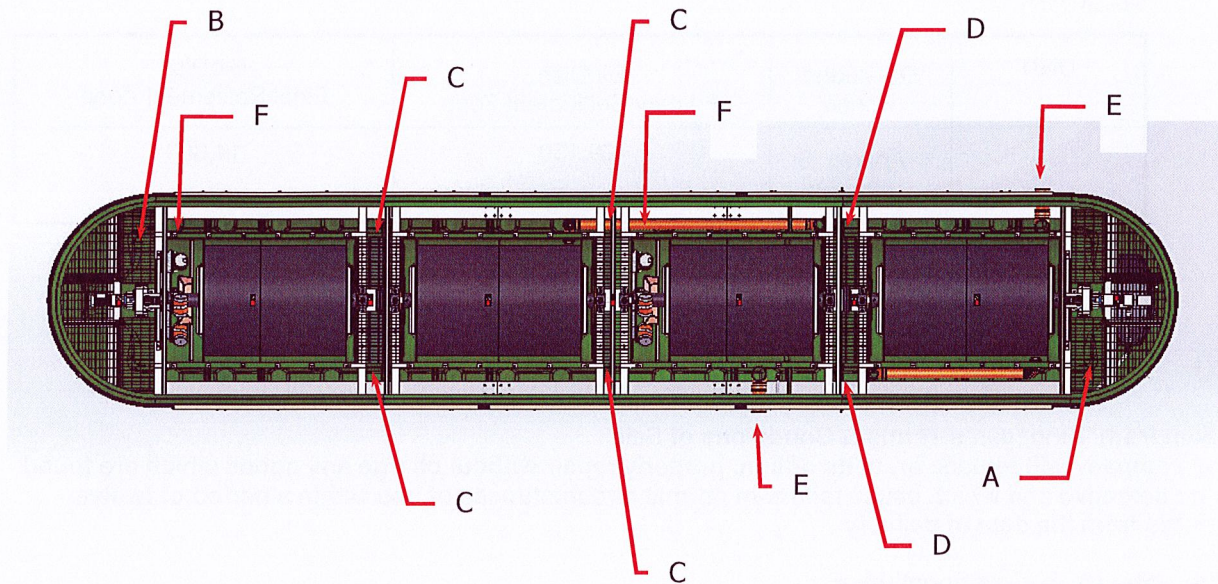
- 8.1.1 Check that the rotors are running smoothly in the correct direction of rotation (see section 8.1.2) and are not contacting any part of the fixed structure.
- 8.1.2 Check that the forward feed buckets are discharging correctly from both first to second stage Biozones.
- 8.2 Loss of Rotation Alarm
 - 8.2.1 Check operation of the Loss of Rotation (LOR) Alarms as follows:
 - 8.2.1.1 Open the Control Panel and switch off the drive motor circuit breakers. After a delay of 2-3 minutes the alarm should activate.
 - 8.2.1.2 Push the "Beacon Off" button on the front of the Control Panel. The alarm beacon should stop flashing and the red indicator light on the panel front should remain illuminated.
 - 8.2.1.3 Switch on the drive motor circuit breakers and close the Control Panel. The alarm should cease after approximately one minute.
 - 8.2.1.4 Depress and release the "Beacon Off" button to reset it.
 - 8.2.2 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.
- 8.3 Customer Checks
 - 8.3.1 The following periodic checks should be carried out monthly. Your attention is specifically drawn to the Health and Safety section of this manual.
 - 8.3.1.1 Visually check the general condition of the plant and listen for any unusual noises. Report any aspects of concern to your maintenance engineer.
 - 8.3.1.2 Check the appearance of the Biomass. It should be light grey to grey at both first banks, gradually changing to brown in both second stages and dark brown at the drive end of each second stage. If the growth is excessively thick and the colour predominantly grey throughout, an overload condition is indicated.
 - 8.3.1.3 Visually check that all fixings are secure.
 - 8.3.1.4 Clear any debris from inlet and outlet pipes.
 - 8.3.1.5 Check dosing buckets and transfer pipes for any build up of debris. Clean, if required, using a stiff bristled brush.
 - 8.3.1.6 Check the Loss of Rotation Warning Devices for correct operation (see section 8.2). If the alarm does not operate properly, contact your maintenance engineer.

9 Desludging and Maintenance

- 9.1.1 These are vital to the plant's ongoing operation and should be carried out in accordance with the guidelines in this manual.
- 9.1.2 Mechanical and electrical maintenance must be performed by properly trained engineers, with reference to the appropriate Maintenance Manual. Kingspan offer a range of maintenance packages, details on request.
- 9.1.3 Kingspan BioDiscs 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.
- 9.1.4 Kingspan offer various levels of contract maintenance of all BioDisc Systems through Kingspan Environmental Services who can be contacted on 0844 846 0500.

9.2 Sludge Removal

9.2.1 Refer to the illustration below for recommended de-sludge positions. (Note: Illustration is typical; individual units may vary).



- 9.2.2 Isolate power to the BioDisc (and Pump Station if applicable) at the Control Panel(s).
- 9.2.3 Undo the BioDisc cover latches and fold back the hinged cover sections as required to gain access. Alternatively the covers can be completely removed if wished. Hinged sections should be folded back before lifting off.
- 9.2.4 Remove any surface scum from the Final Settlement Tank [A]. The steel mesh may be removed for access if required. Lower the hose to the bottom of the tank and remove any settled sludge. Also de-sludge at points [D] on either side of the rotors and along the length to prevent 'rat-holing'. The steel mesh over points [D] may be removed for access if required. Replace any removed steel mesh.
- 9.2.5 Remove surface scum from the BioDisc Primary Settlement Zone at point [B] and de-sludge at points [C] on either side of the rotors. De-sludge along the length of the rotors to prevent 'rat-holing'. The steel mesh over points [B] and [C] may be removed for access if required.
- 9.2.6 **Note:** While de-sludging ensure that there is never more than 250mm difference in water levels between points [A] and [C].
- 9.2.7 **DO NOT** attempt to remove any liquid from any Rotor Section.
- 9.2.8 **DO NOT** attempt to clean off the gelatinous growth on the rotors.
- 9.2.9 Ensure that the BioDisc inlet and outlet pipes [E] and the Forward Feed Buckets [F] are free of debris.
- 9.2.10 Ensure that all safety meshes are replaced, then close and lock the BioDisc covers.
- 9.2.11 Units with separate Primary Tank only - Remove the covers from Primary Settlement Tank. Remove any surface scum in the Primary Settlement Tank, then lower the hose into the bottom of the tank and completely remove settled sludge. It may be necessary to empty the tank completely to ensure full sludge removal. Ensure that the inlet and outlet pipes are clear of debris, and then replace the covers.
- 9.2.12 All units - Re-connect the power supply. 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.

9.3 Desludge Volumes

- 9.3.1 The minimum volumes shown here are those which can be anticipated under full loading at the de-sludge period indicated. If the system is not loaded to full capacity, the de-sludge period and volumes removed may be adjusted, but it is essential that a) sludge is not allowed to accumulate to the detriment of the process and b) all settled sludge and floating matter are removed at each de-sludge visit.

UNIT	De-sludge Period	BioDisc Primary Settlement Zone	BioDisc Final Settlement Zone
BN	Approx. 3 months	29,150 (6,412)	14,300 (3146)

Note: Volume is in litres (gallons below in brackets)

10 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 the Warranty department on 0844 225 2785.

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

11 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.

- * BN BioDisc requires routine maintenance and Desludging at 3 month intervals.

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.

GL0331P

Balance Tanks Installation, Operation & Electrical Guidelines



Kingspan Pollution Control Ireland	
Unit 1a off Derryboy Road, Carnbane Business Park, Newry. BT35 6QH	
Tel: +44 (0) 28 3026 6799	Fax: +44 (0) 28 3026 0046
Website: www.kingspan.com	Email: KPCI@kingspan.com

Attached Documents

DS0637P	Balance Tank Customer Drawing
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Issue	Description	Date
02	CC526	November 2007

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 become 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 Tekserv on 0845 355 0555 for details.

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

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 should be isolated at the main RCD before lifting the blower cover.

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 contained in these guidelines.

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1 Installation Guidelines

- 1.1.1 Before beginning the installation, the whole of these instructions must be read and complied with. Also, the following points must be noted:
- 1.1.1.a Adherence to good Working Practices and the Health & Safety at Work Act on site should be observed.
 - 1.1.1.b Prior to installation, check the tank for damage and always handle with care, avoiding heavy impact or contact with sharp objects.
 - 1.1.1.c On no account should the specified maximum drain invert depth be exceeded.
 - 1.1.1.d Never fill a freestanding tank with water or back fill an empty tank. Always fill the tank with water at the same time as the back fill material is placed. This avoids the risk of flotation and minimises the applied loads to the tank.
 - 1.1.1.e These instructions assume no more than pedestrian duty loadings will be applied to the final installation. Traffic or other heavy superimposed loads must not be transferred through the walls of the tank.
- 1.1.2 The Concrete Specification is not a site specific installation design.

GUIDELINE CONCRETE SPECIFICATION IN ACCORDANCE WITH BS 5328 PARTS 1,2,3 AND 4		
TYPE OF MIX		DESIGN
PERMITTED TYPE OF CEMENT		BS 12 (OPC): BS 12 (RHPC): BS 4027 (SRPC)
PERMITTED TYPE OF AGGREGATE (coarse & fine)		BS 882
NOMINAL MAXIMUM SIZE OF AGGREGATE		20 mm
GRADES: C30 (30 N/mm ²) C20 (20 N/mm ²)		REINFORCED & ABOVE GROUND WITH HOLDING DOWN BOLTS REINFORCED (EG. FOR HIGH WATER TABLE) UNREINFORCED (NORMAL CONDITIONS)
MINIMUM CEMENT CONTENT	C30	270 - 280 Kg/M ³
	C20	220 - 230 Kg/M ³
SLUMP (NOT IN ACCORDANCE WITH BS 5328)		25mm
RATE OF SAMPLING		READY MIX CONCRETE SHOULD BE SUPPLIED COMPLETE WITH APPROPRIATE DELIVERY TICKET IN ACCORDANCE WITH BS 5328 PART 3

NOTE: STANDARD MIXES SHOULD NOT BE USED WHERE SULPHATES OR OTHER AGGRESSIVE CHEMICALS EXIST IN GROUND WATER

1.2 Installation

- 1.2.1 Having excavated, if the base is excessively wet or unstable, lay 200mm of hard-core and line with polythene prior to laying the 200mm level base of concrete. If necessary, make a sump hole to one corner of the excavation to accommodate a suction hose from a site pump, thereby keeping the excavation as dry as possible. Lower the tank on to the levelled concrete, ensuring the top of the tank is completely level and that all connections line up. With the tank in position commence filling with water and at the same time back fill with concrete to just below the outlet/inlet levels.
- 1.2.2 It is important that these two operations are carried out simultaneously to avoid the risk of flotation. When back filling with concrete it is essential that the underside of the tank is evenly supported and there are no voids, especially on the underside between the ribs. We do not recommend the use of vibrating lances. Make the inlet, outlet and air duct connections. Continue back filling to 50mm below the top of the necks with concrete.
- 1.2.3 It is essential that all surface water be segregated and excluded from entry to the tank.
- 1.2.4 A dip pipe is supplied separately. To be fitted on-site into the inlet. To fit; push the "T" piece over the spigot in the neck of the tank, making sure the longer section is positioned into the tank; the shorter section is for rodding purposes.

1.3 Necks

- 1.3.1 Having back filled to just below the top of the neck. Fit the access shaft ensuring all surfaces are dry and then spread both tubes of mastic liberally around the base of the shaft and the flange of the tank. Line up the necks and bolt the flanges together, ensuring a good & even compression of the mastic so as to provide a watertight seal. Continue back filling to ground level with free flowing soil, taking care not to strike the access shaft and disturb the mastic seal. The shaft may be trimmed at ground level and capped off in the normal way with a manhole cover and frame.

1.4 Airlift Transfer

- 1.4.1 The balance tank pumps to a treatment plant using an airlift transfer pump powered by a blower. The airlift is supplied complete with the balance tank.
- 1.4.2 The airlift is to be positioned in the outlet access shaft. The horizontal section of the airlift is to be positioned in the outlet socket and the vertical pipe connected to the access shaft with two macflow clips shown in the drawing DS0637. The air hose is fed through the air duct socket (82mmØ) to the blower housing.

1.5 Airline Ducting

- 1.5.1 In the course of making the air duct connection, it will be necessary to run 110mm ducting from the air blower-housing base. This ducting must connect up through an independent concrete base for blower housing location. The duct must be laid with long radius bends to enable the hose to be fed through. The slab should be located 3-13 metres from the tank such that the 15metres of hose provided is sufficient.
- 1.5.2 The slab should be 150mm thick and be large enough to accommodate the blower enclosure. The location should take into account noise sensitivity and preferably be in a shaded position. Once the air hose is installed the annulus around the top of the duct should be filled with spray foam.
- 1.5.3 Electrical connection from the supply should be made by a competent electrician in accordance with the appropriate regulations.

1.6 Invert Detail

- 1.6.1 The tank is supplied with up to a 0.9 metre inlet invert. Care should be taken so that the outlet pipework does not run uphill to the treatment plant. A minimum fall of 50mm from the primary tank to the treatment plant should be maintained.

2 Electrical Guidelines

2.1 General Notes on Outside Electrical Installation

- 2.1.1 Only qualified and competent persons should carry out any electrical installation. Outside electrical installations can present dangers that are not usually encountered in internal electrical wiring. External equipment is subjected to the elements and particular attention must be made to the suitability of the cable, glands, connection units etc. for outside use. The possibility of attack by vermin should also be considered and adequate precautions taken.

These notes are not intended to replace the latest I.E.E. Wiring Regulations.

2.2 Health & Safety at Work, etc. ACT 1974

- 2.2.1 To ensure that the equipment described is safe both for personnel and property it should be installed, commissioned and maintained by or under the supervision of qualified persons. Regard should be taken of IEE Wiring Regulations, Codes of Practice, Statutory Requirements and any specific instructions issued by the supplier of these details.
- 2.2.2 *Earthing - All equipment must be earth bonded in accordance with the latest IEE Wiring Regulations.*
- 2.2.3 *We reserve the right to alter these details without prior notice.*

2.3 Electrical Supply

- 2.3.1 The electrical feed should be dedicated to the equipment and not used for any other purpose. The supply should be via a suitable RCD unit backed up by either a motor rated fuse, or preferably a motor rated MCB of suitable rating.
- 2.3.2 The RCD must be of the two-pole variety rated at 40A/30mA. (If nuisance tripping is experienced then a sensitivity of 100mA should be used, but this does reduce the personnel protection capability).

2.4 Cable Installation

- 2.4.1 The type and size of cable depends upon site conditions and distance. If conduit/ducting is possible then providing mechanical and vermin attack protection is provided, single cables of adequate size can be used. However, the preferable method would be to use steel wire armoured (SWA) cable. This should be buried in the ground at a depth of 600mm laid on sand with warning tapes on the cable and an additional tape at a depth of 150mm. External type SWA glands should be used on all make offs.
- 2.4.2 For loads up to 0.75kW and runs of less than 100 metres, 2.5mm² 3 core SWA is adequate. For loads up to 1.55kW and runs of more than 100 metres, 4.0mm² 3 core SWA should be used. It is a requirement to use the unused core in the cable for the earth conductor and this should be sleeved with earth sleeving at both connection points.
- 2.4.3 This unit is designed to be simple to install and safe in operation. Any modification may adversely affect its weather resistance in operation. If in any doubt, please consult us for advice. This is a sealed unit and not serviceable.

2.5 Blower Isolator Electrical Details

- 2.5.1 Ensure that the blower housing is protected by a suitable RCD to BS 4293 and a MCB to BS 3871. Cable installation below ground should be SWA to BS 6346, unless otherwise stipulated. The blower isolator housing provided includes an overload trip. This overload trip will be pre-set to 1.1 times the blower full load current.
- 2.5.2 Before switching on the blower, ensure the air filter is correctly fitted and that the air intake is completely free of obstruction.



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