BMC BELL MUNRO CONSULTING

DRAINAGE STRATEGY

Donkley Wood Holiday Chalets

Document Control Sheet

Client:

Project Title: Donkley Wood Holiday Chalets

Project Reference: 178-20-002

Rev	Date	Comments	By	Ckd	App
P01	16 Sep 20	Initial Issue	LKT	AB	AB

Contents

1 INTRODUCTION

1.1 General

1.1.1 Bell Munro Consulting have been commissioned to undertake the drainage design of the proposed holiday chalets at Donkley Wood. Grid Ref NY784865 (E 374888, N 586542)
1.1.2 The proposed construction is of 4No. holiday chalets
1.1.3 Planning permission application status is currently unknown

1.2 Existing site conditions

1.2.1 The site is currently greenfield with a wood surrounding the site
1.2.2 There is an unnamed road to the south.

1.3 Existing site geology

1.3.1 No site investigation report has been received.
1.3.2 From the British Geological Survey maps it is possible to see that the superficial deposits are Till, Devensian – Diamicton
1.3.3 From the British Geological Survey maps it is possible to see that the bedrock is Limestone and Sandstone

1.4 Proposed site plan

1.4.1 The proposals are to add 4No. holiday chalets to the site

2 DRAINAGE PROPOSALS

2.1 Existing Surface Water Drainage

2.1.1 As the site is greenfield no drainage is provided on site, and rainfall naturally percolates to the ground, or transits as overland flow to the stream at the south of the site.

2.2 Proposed Surface Water Drainage

2.2.1 As the only drainage required on site will be for roof drainage it is proposed to discharge this directly to the ground at the rear of each of the chalets for it to naturally percolate

2.3 SUDS

2.3.1 The SuDS Manual (C753) details a wide range of drainage techniques some of which may be incorporated into the proposed drainage design. Of the proposed recommendations, it is advised that the following SUDS are adopted for this site:

- Rainwater Harvesting
- Infiltration systems

2.3.2 The site is also to have rainwater harvesting tanks added to the down pipes to the rear of each chalet providing a minimum of 100l of storage to each chalet – location of these to be decided by on site

2.4 Operation and Maintenance Proposals

2.4.1 It is proposed that the Proposed SuDS are to be maintained by the site owner once development is completed.

2.4.2 It is recommended that the following maintenance schedule be adopted in the health and safety plan.

Maintenance Schedule	Required Action	Typical frequency
Standard Drainage Systems		
Regular Inspections	1. Visually inspect all gullies and inlets to ensure no obstructions or sediment build up is occurring.	Monthly or following severe storm events.
	2. CCTV survey of pipe network to ensure no build-up of sediment in pipe network.	Every 5 years or following performance issues.
Regular Maintenance	1. Removal of debris from catchment surfaces where this may cause risks to the performance of the drainage systems	Monthly or as required.
	2. De-silting operations to trapped gullies and pre-treatment systems where appropriate.	Six monthly or as required.
Remedial works	1. Re-setting displacement manhole covers in trafficked areas.	As required.
	2. De-silting operations to the pipe network.	As required.
Infiltration systems		
Regular Inspections	1. Visually inspect the areas of discharge 2. Visually inspect for erosion/settlement. 3. Check for debris and litter	Monthly
Regular Maintenance	1. Remove debris and litter from surface	Annually or as required

	2. Removal of weeds & invasive plants.	
Remedial Works	1. Structural rehabilitation 2. Infiltration surface reconditioning	Repair areas that are sunken as required. As required, to be inspected after 10 years, then every 5 years following.

2.4.3 The converted chalets are to have a 100-litre of rainwater tank added to each chalet location to be decided on site.

2.5 Proposed Foul Water Drainage

2.5.1 No public sewers are available to discharge to in the area

2.5.2 A take-off of the DU rates for the buildings is given below for a Type 1 system.

Item	DU	Chalet				Total
		1	2	3	4	
Wash Basin	0.5	1	1	1	1	4
Shower No Plug	0.6	1	1	1	1	4
Bath	0.8	1	1	1	1	4
Kitchen Sink	0.8	1	1	1	1	4
Dishwasher	0.8	1	1	1	1	4
Washing Machine 6kg	0.8	1	1	1	1	4
WC 6L	2.0	1	1	1	1	4
		6.3	6.3	6.3	6.3	25.2
	k=	0.7				
	Qfw,peak	1.76	1.76	1.76	1.76	**3.51**

2.5.3 A take-off of the Flows and Loads for the buildings is given below

Item	Chalet				Total	
	1	2	3	4		
Bedrooms	2	2	2	4	10	
Persons	5	5	5	9	24	
					24	PE
Flow (l/day)	227		x	24	**5448**	
BOD (grams/day)	94		x	24	**2256**	
Amonian (grams/day)	10		x	24	**240**	

2.5.4 A $Q_{FW,Peak}$ of 3.51l/s is to be used for the FW peak flow from the development.

2.5.5 A volume of 5.49m^3 daily is to be used for the FW volumetric daily flow.

2.5.6 It is proposed that discharge from the site will be discharged unrestricted to the stream to the south of the site.

3 CONCLUSIONS

3.1 This Drainage Strategy for the proposed construction of Holiday Chalets has been prepared in accordance with the NPPF and the Flood Risk and Costal Change Planning Practice Guidance. It has been confirmed that the development is not contributing to flood risk in the area.

4 DISCLAIMER

4.1.1 This report is confined to the terms referred to in Section 1 of this report.

4.1.2 This report is our opinion based on data from 3rd party sources as it exists at this moment in time and is confined to the terms of our brief in Section 1 of this report.

4.1.3 We have not undertaken any onsite testing of the existing drainage regime nor have we undertaken any level surveys of the existing topography.

4.1.4 This report is solely for the use of the addressee and no responsibility can be accepted to any third party for the whole or part use of this report and its content.

Report Prepared By:

LK Taylor

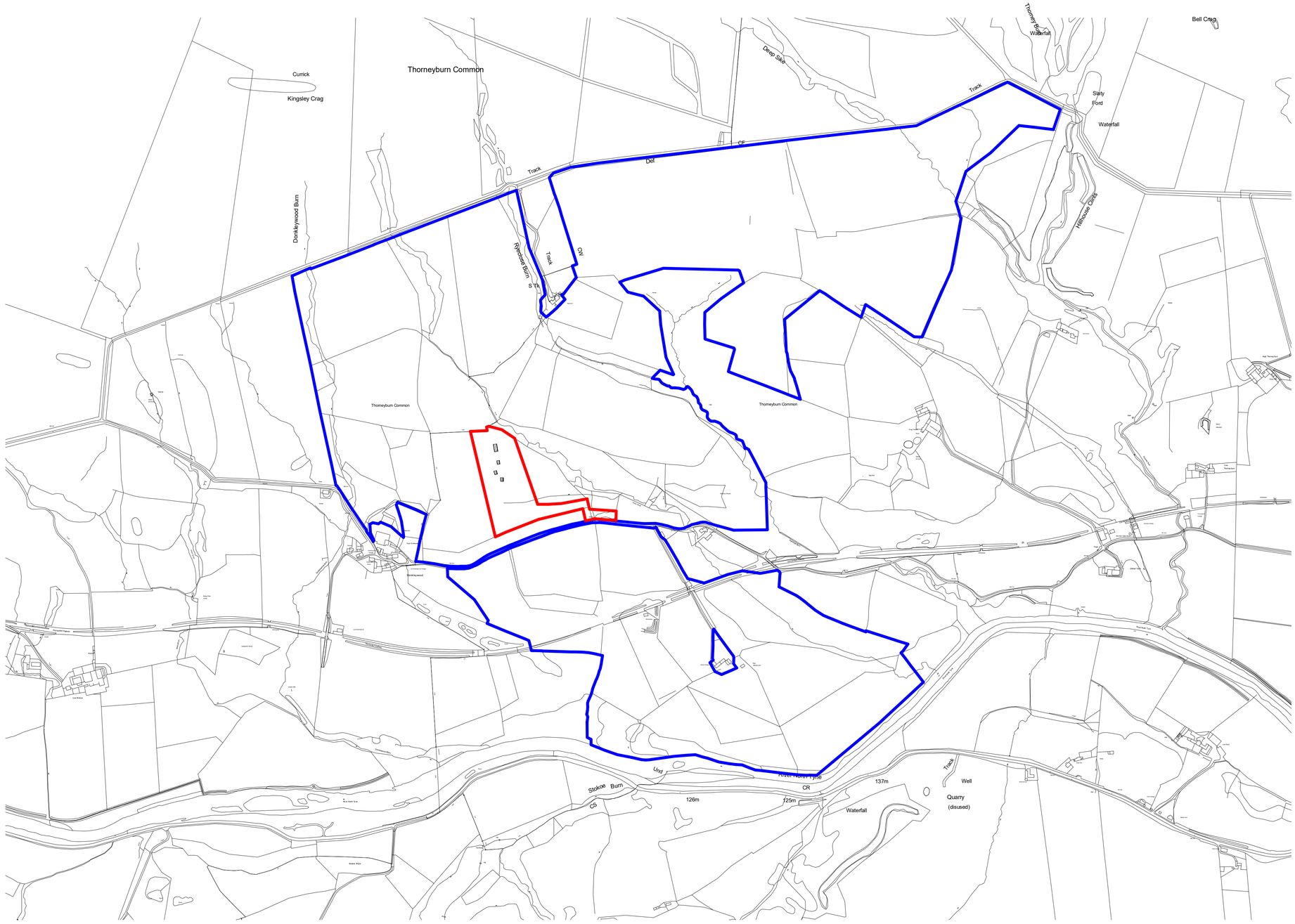
Lee K. Taylor
BEng *(Hons)*, GIMCE

Report Checked and Approved By:

A Bell

Andrew Bell
B.Eng *(Hons)* C.Eng M.I.Struct.E

APPENDIX A – EXISTING PLANS



Revision:	Description:	Date
P1	First Issue	15/06/20

INARCHITECTURE
www.inarchitecture.co.uk

Project Number: 672
Scale at A1: As indicated

Drawing Title:
Lodges, Donkleywood
Location Plan

Drawing Number:
Project Number: DKWINA-00-00-DR-A- 000-01

Project Status: S2 ISSUED FOR INFORMATION
Revision: P1 Revision Description: PRELIMINARY

CW

PST1

PST2

PST10

PST3

PST4

PST8

PST5

PST6

BT

160.9m

N

Site Boundary

Adjoining Ownership

Revision:	Description:	Date
P1	First Issue	15/06/20

INARCHITECTURE
www.inarchitecture.co.uk

Project Number: 672
Scale at A1: As indicated

Drawing Title:
Lodges, Donkleywood
Existing Site Plan

Drawing Number:
Project: DKWINA-00-00-DR-A-
Number: 010-01

Project Status: S2
Suitability Description: ISSUED FOR INFORMATION

Revision: P1
Revision Description: PRELIMINARY

APPENDIX B – PROPOSED PLANS

CW

PST1

N 586628757
E 374860679

N 586599446
E 374867102

N 586576528
E 374865788

PST10

N 586559918
E 374875139

BT

PST3

PST4

PST5

PST6

PST8

160.9m

N

Site Boundary

Adjoining Ownership

Revision:	Description:	Date
P1	First Issue	15/06/20

INARCHITECTURE
www.inarchitecture.co.uk

Project Number: 672
Scale at A1: As indicated

Drawing Title:
Lodges, Donkleywood
Proposed Site Plan

Drawing Number:
Project: DKWINA-00-00-DR-A-
Number: 110-01

Project Status: S2 ISSUED FOR INFORMATION
Revision: P1 Revision Description: PRELIMINARY

GENERAL

G01. THIS DRAWING IS COPYRIGHT AND THE PROPERTY OF BELL MUNRO CONSULTING LTD. THE DRAWING MUST NOT BE REPRODUCED IN PART OR IN WHOLE WITHOUT PRIOR WRITTEN AUTHORITY.

G02. THIS DRAWING MUST NOT BE SCALED BY EITHER CONTRACTORS OR OTHER CONSULTANTS ANY DIMENSIONAL OR SETTING-OUT DISCREPANCIES ARE TO BE REPORTED TO BELL MUNRO CONSULTING PRIOR TO CONSTRUCTION / FABRICATION COMMENCING.

G03. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS AND ARCHITECTS INFORMATION.

G04. WHERE NOT STATED ELSEWHERE, THE MINIMUM STANDARDS TO BE ADOPTED ARE THOSE GIVEN IN BS 8000 AND THE BUILDING REGULATIONS APPROVED DOCUMENT A.

G05. REFER TO DRAWINGS BY OTHERS FOR:
- SETTING OUT
- FIRE PROTECTION
- STACK LOCATIONS / SERVICE PENETRATIONS
- DPM / INSULATION / FINISHES DETAILS

G06. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THE AREA TO BE EXCAVATED IS FREE FROM ANY SERVICES OR STRUCTURES THAT MAY BE ADVERSELY AFFECTED BY THE WORKS

DRAINAGE

D01. PIPEWORK TO BE WAVIN TWINWALL (100mm); OR SIMILAR APPROVED.

D02. ALL STACKS, DOWNPIPES AND GULLIES TO BE RODDABLE.

D03. SULPHATE RESISTING PORTLAND CEMENT TO BE USED IN ALL CASES (INCLUDING PRECAST CONCRETE) EXCEPT FOR CONCRETE HAVING AN EQUIVALENT COMPRESSIVE STRENGTH LESS THAN C16/20.

D04. WHERE SEWERS UNDER ROADS HAVE LESS THAN 1.2m OF COVER A 150mm (GEN3 C16/20) CONCRETE BED AND SURROUND TO BE PROVIDED.

D05. MINIMUM FALLS:
- FOUL BRANCHES 1: 40 (2.5%)
- BETWEEN FOUL ACCESS CHAMBERS 1: 80 (1.25%)

D06. PIPE DIAMETERS 100mm MINIMUM OR AS SHOWN.

D07. ACCESS CHAMBERS, CONNECTIONS AND PIPEWORK ARE SHOWN APPROXIMATELY. FINAL POSITIONS TO SUIT INTERNAL AND EXTERNAL FINISHES.

D08. AFTER COMPLETION, PRIOR TO HAND OVER, ALL SEWERS TO BE CLEANSED AND INSPECTED TO ENSURE THEY ARE OPERATIONAL; NO BUILDING MATERIALS HAVE ENTERED THE SYSTEM AND NO DAMAGE HAS OCCURRED DURING THE BUILD.

D09. ALL DRAINAGE COVERS TO COMPLY WITH BS EN 124 RATING.

D10. CONSENT TO DISCHARGE WILL BE REQUIRED FROM THE ENVIRONMENT AGENCY.

F1 (189.200) CL 189.650
F1 (187.150) 150mm / 1:15
F2 (184.650) CL 185.300
F2 (183.000) 150mm / 1:15
F3 (181.450) CL 182.100
F3 (181.000) 150mm / 1:15
F4 (179.450) CL 180.100
F4 (179.000) 150mm / 1:15
F5 (178.250) CL 178.900
F5 (178.000) 150mm / 1:15
F6 (171.540) CL 172.070
F1.004 / 100mm / 1:72.1
F7 (171.500/171.405) CL 172.070 STP
F1.005 / 100mm / 1:5.5
F8 (170.925/170.730) CL 172.070 SAMPLE CHAMBER
F1.006 / 100mm / 1:80
DISCHARGE POINT 170.650
BT

Rev	Date	Description	By	Check	App
P01	10 SEP 20	INITIAL ISSUE	LKT	AB	AB

BMC

BELL MUNRO CONSULTING LIMITED

CONSULTING CIVIL AND STRUCTURAL ENGINEERS
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ELEVENTH AVENUE NORTH
TEAM VALLEY TRADING ESTATE
GATESHEAD
NE11 0NJ

Tel. 0191 4200499
Fax. 0191 4200498
email info@bellmunro.co.uk

Client: INARCHITCTURE

Project: DONKLEY WOOD

Office: NEWCASTLE-UPON-TYNE

Title: PROPOSED FW DRAINAGE

Drawn	LKT	Date	10 SEP 20
Checked	AB	Scale @ A0	1:200
Approved	AB	Status	PRELIMINARY

Job Number	Drawing Number	Revision
178-20	001	P01

APPENDIX C – NWL RESPONSE

Lee Taylor

From: Property Solution - Plans <plans@nwl.co.uk>
Sent: 17 August 2020 10:00
To: Lee Taylor
Subject: RE: 178-20 Donkley Woods

Follow Up Flag: Follow up
Flag Status: Completed

Good Morning

I can confirm that there are no assets owned by ourselves within the red boundary on your plan. The nearest asset is a water main over 200 metres south of your site. There are no sewer assets for at least a 650 metre boundary.

Kind regards

Jammie Dawson
Property Solutions Customer Assistant
Email: assetplans@eswater.co.uk or plans@nwl.co.uk

Northumbrian Water Group and Essex & Suffolk Water.
RASWA Department, Boldon House, Wheatlands Way, Pity Me, Durham, DH1 5FA

From: Lee Taylor [mailto:ltaylor@bellmunro.co.uk]
Sent: 11 August 2020 13:37
To: Property Solution - Plans
Cc: Andrew Bell
Subject: 178-20 Donkley Woods

Hello,

Could we get NWL sewerage asset plans for Donkley Woods grid reference NY 748 865.

If you have any questions or queries please contact us by return email, or by the office details below.

Please note: Starting on Friday 28Aug20 I will be on annual leave, I will return to the office on Monday 07Sep20.

Kind regards,

Lee Kenneth Taylor
BEng(*Hons*), GMICE
Project Engineer

For and on behalf of Bell Munro Consulting (North East) Limited

BMC

Bell Munro Consulting
Consulting Civil and Structural Engineers
J29 The Avenues
Eleventh Avenue North
Team Valley Trading Estate
Gateshead
Tyne & Wear
NE11 0NJ

Tel (Office): 0191 487 8214
Fax (Office): 0191 491 3394
Mob (Personal): 0749 585 2850
Email: ltaylor@bellmunro.co.uk

Please consider the environment before printing this e-mail.

APPENDIX D – STP OPTIONS

STP Options

Manufacturer	Model	Capacity	Price (exc. VAT)
WPL	WPL Diamond DMC 8	36-45PE Domestic	£8,754
KEE Process	KEE01HR NuDisc + Sample Chamber	24PE Chalet	£13,545
Kingspan	BE BioDisc -600mm invert + kiosk + commissioning	36PE Domestic	£11,665

WPL®
DIAMOND

SIMPLE, RELIABLE & DISCREET

Compact wastewater treatment plant

WPL Diamond

Environmentally compliant

Our range of WPL Diamond small packaged wastewater treatment plants are suitable for domestic and commercial properties in all ground conditions where mains drainage is unavailable.

Every day over 36 million litres of water is recycled back in to the environment through our WPL Diamond wastewater treatment plants. Our high quality treatment process consistently meets increasing regulations set by the Environment Agency, safely discharging (final effluent) into a soakaway or watercourse.

British design and build

Designed and built at WPL, our patented Diamond not only gives you the highest quality process on the market, but also provides you with a discreet, efficient and cost-effective solution for the longevity of the plant. This is achieved through our continued commitment to improve product design, development and manufacturing processes; backed by our commitment to engineering excellence for over 25 years.

Trusted network

Our trusted network of independent experts can offer professional advice on project specifications, compliance and guidelines; whilst providing installation, service and maintenance.

WPL Promise

WPL has been at the forefront of wastewater treatment for over 25 years; understanding your need for a high quality, easy to maintain and discreet product.

Low maintenance and long-term value:

- **Longer emptying cycles (up to 3 years desludge) -** due to our highly efficient aeration process which breaks down organic matter at a reduced sludge growth rate.
- **No internal electrical or mechanical moving parts -** inside the tank, offering minimal maintenance compared to other processes on the market which are prone to breaking down.
- **25 years tank warranty -** and 2 years warranty on the blowers (housed in the kiosk)*.

Compliant - meeting standards and codes of practice:

- **Fully tested, accredited and certified -** under European Standard BS EN12566-3 2014 approval which allows a CE mark.
- **Meets consent standards -** of 20mg/l BOD; 30mg/l SS; 20mg/l NH_4 as a minimum.
- **General Binding Rules update 1st January 2020 -** unlike a septic tank we consistently meet the General Binding Rules: small sewage discharge to surface water.
- **Part H2 UK -** of building regulations.
- **Binding Rules legislation -** for exemption from a permit to discharge by the Environmental Agency.
- **LABC registered**
- **Designed using the British Water Code of Practice Flows and Loads -** to ensure that the tank is correctly sized.
- **Safe discharge -** of final effluent into a soakaway or watercourse.

Discreet

- **Our plant is odourless -** so you won't even know it's there!*.
- **Flushest lids to the ground -** creating perfect integration in to the landscape.
- **Compact in design -** keeps the excavation to a minimum and installation simple.
- **Range of invert depths -** for complicated sites, allowing more discharge options.

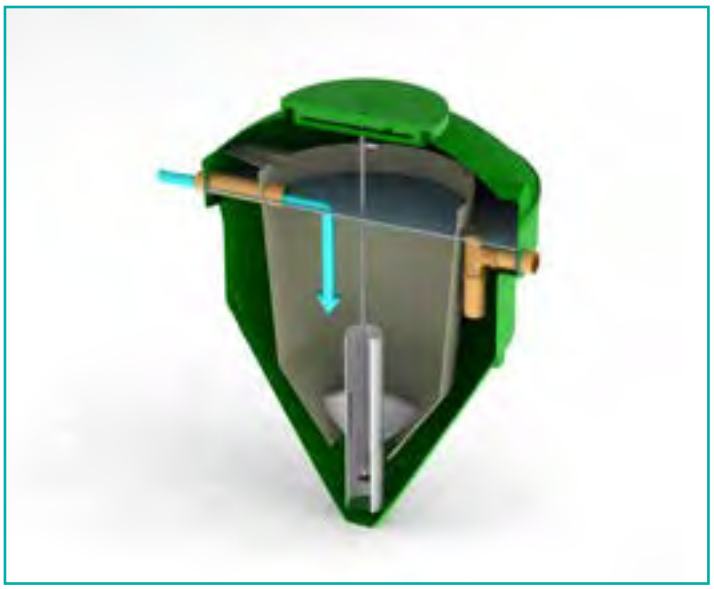
*subject to correct installation, consistent influent conditions and regular plant maintenance as per the manufacturers' instructions

Ideal septic tank replacement -
General Binding Rules regulation update

Homeowners with septic tanks that discharge directly into the surface water will now need to consider the option of replacing with a packaged wastewater treatment plant such as a WPL Diamond – by (or before) the 1st January 2020 when selling a property or upgrading an 'end of life' septic tank.

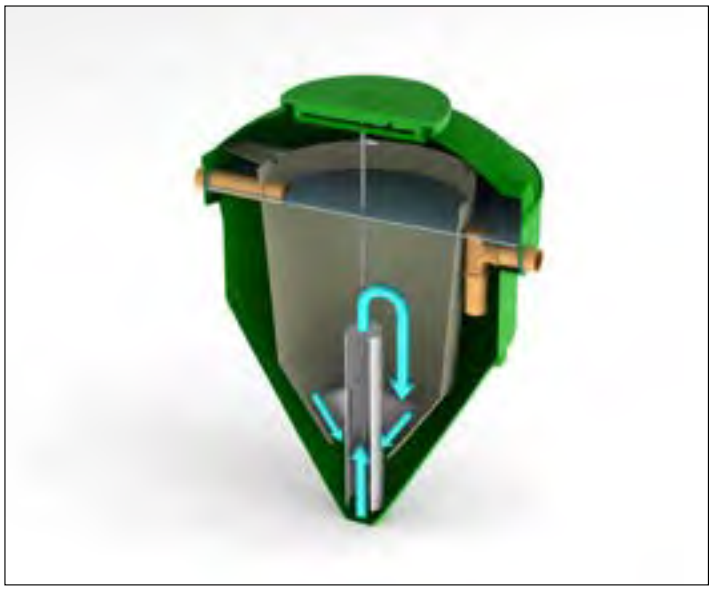
WPL Diamond illustration not to scale

Simple and reliable operation

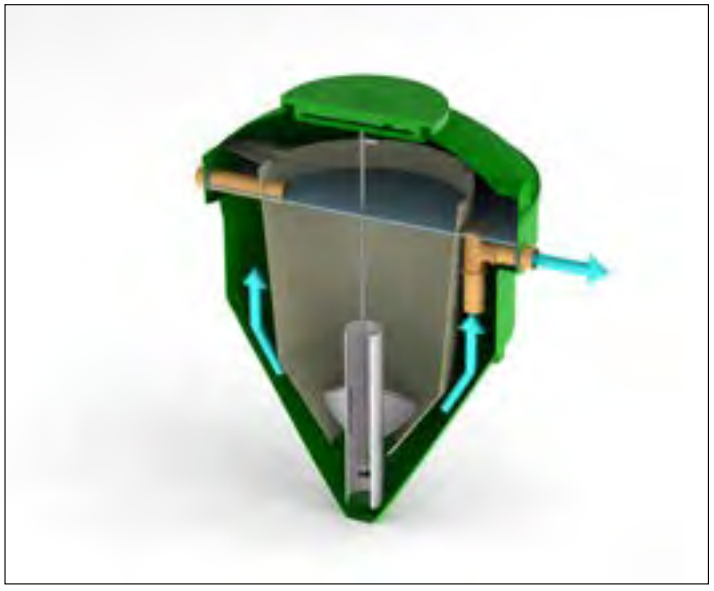


1: The wastewater flows into the main tank and enters directly into the bio-chamber.

The bio-chamber is a zone where the solids circulate continuously; this is achieved by air rather than mechanical or electrical parts inside the tank.



2: The draft tube enables the solids to be drawn back up into the central aeration chamber and re-circulated through the treatment process.



3: The treated liquid then exits through the dip pipe and is discharged safely in to the environment, meeting the required consent standard.

Technical Specification

Loadings

Model	DMS2	DMS3	DMS4	DMS5	DMC6	DMC7	DMC8	DMC9
Population range (persons)	1-6	5-11	10-15	14-20	21-27	28-35	36-45	46-55
Blower motor size (kw)*	0.080	0.090	0.160	0.230	0.230	0.221	0.221	0.221
Total power consumption	0.080	0.090	0.160	0.230	0.460	0.663	0.663	0.663

*Actual power consumption may vary (dependent on motor efficiency and nature of installation), size stated is motor size NOT actual power consumption. Blower options available on request.

Dimensions

Model	Max outside diameter (m)	*Inlet invert depth (mm)	Max height/ in ground depth (m)	Weight empty (kg)
DMS2	1.74	630	2.33	155
DMS3	1.96	760	2.59	192
DMS4	1.99	780	2.78	210
DMS5	1.99	780	2.78	210
DMC6	3.30	570	3.35	380
DMC7	3.30	570	3.35	380
DMC8	3.30	580	3.72	460
DMC9	3.30	580	3.72	460

* Deeper inverts can be accommodated with our range of standard invert extensions. All dimensions +/- 3% tolerance.

We can help you with additional information or recommend your nearest independent expert for installation, service and maintenance of your WPL Diamond packaged sewage treatment plant.

For more information contact us at:

wpldiamond.com

WPL® DIAMOND

Our roots

WPL have been at the forefront of wastewater treatment technology for over 25 years, with international experience of technical design, quality of manufacture and supply of environmental wastewater solutions.

Our high level of expertise means that we offer all of our customers, from the individual home owner to the large municipal communities and industrial markets, robust wastewater treatment process solutions that are environmentally compliant.

Contact

WPL Limited
Unit 1 Aston Road
Waterlooville
Hampshire
PO7 7UX
United Kingdom

Tel: +44 (0)23 9224 2600
Email: enquiries@wpl.co.uk
Web: wpldiamond.com

WPL independent expert:

Lee Taylor

From: Becky Belton <becky.belton@wpl.co.uk>
Sent: 10 September 2020 11:54
To: Lee Taylor
Subject: Re: 178-20 Donkleywood - Sewerage Treatment Plant

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Lee

Based on the loadings below, I would recommend the WPL Diamond DMC8 which is for 36-45 people

The WPL Diamond DMC8 RRP price is £8,754 ex vat

SOURCE	P.E	Flo	BO	NH	Flo	BOD	NH
		L/day	g/day	g/day	m3/d	Kg/d	Kg/d
Holiday camp chalet resident	24	227.0	94.0	10.0	5.448	2.256	0.240
				Totals	5.448	2.256	0.240
				DWF	0.06	l/s	
				pe	36	37.6	30
				PFT	16.34	m3/d	
					0.19	l/s	

Becky

Becky Belton | Key Account Manager
dd +44 (0) 2392 242 622
m +44 (0) 7587775951
e becky.belton@wpl.co.uk

WPL Ltd | Unit 1 Aston Road | Waterlooville | Hampshire | PO7 7UX

www.wplltd.com

WPL's response to COVID-19

From: Lee Taylor <ltaylor@bellmunro.co.uk>
Sent: 10 September 2020 10:30
To: Becky Belton <becky.belton@wpl.co.uk>
Subject: RE: 178-20 Donkleywood - Sewerage Treatment Plant

Hello Becky,

I'm just checking with you if you've had a chance to confirm if the STP is suitable for the Chalet Loading below, please note that the Chalet PE is increased now to 24.

Flow	227 x 24	5448 l/day
BOD	94 x 24	2256 g/day
Ammonia	10 x 24	240 N/day

It has a loading of 24PE Chalet, which is approximately equivalent to 36PE domestic
If you have any questions or queries please contact us by return email, or by the office details below.

Kind regards,

Lee Kenneth Taylor
BEng(*Hons*), GMICE
Project Engineer

For and on behalf of Bell Munro Consulting (North East) Limited

BMC

Bell Munro Consulting
Consulting Civil and Structural Engineers
J29 The Avenues
Eleventh Avenue North
Team Valley Trading Estate
Gateshead
Tyne & Wear
NE11 0NJ

Tel (Office): 0191 487 8214
Fax (Office): 0191 491 3394
Mob (Personal): 0749 585 2850
Email: ltaylor@bellmunro.co.uk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From: Becky Belton <becky.belton@wpl.co.uk>
Sent: 13 August 2020 12:32
To: Lee Taylor <ltaylor@bellmunro.co.uk>
Subject: Fw: 178-20 Donkleywood - Sewerage Treatment Plant

Hello,

Thanks for your enquiry

The WPL Diamond DMC6 is for up to 27 people
The RRP price is £7,057 ex vat

Attached is the brochure and drawing

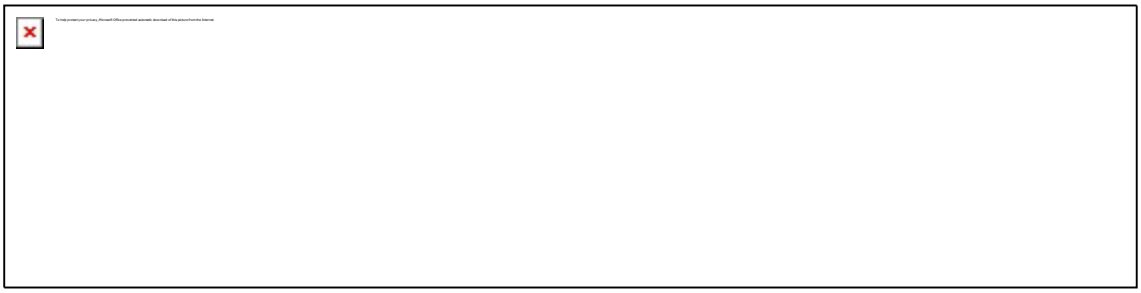
Kind regards
Becky

Becky Belton | Key Account Manager
dd +44 (0) 2392 242 622
f +44 (0) 2392 242 624
m +44 (0) 7587775951
e becky.belton@wpl.co.uk

WPL Ltd | Unit 1 Aston Road | Waterlooville | Hampshire | PO7 7UX

www.wplltd.com

WPL's response to COVID-19



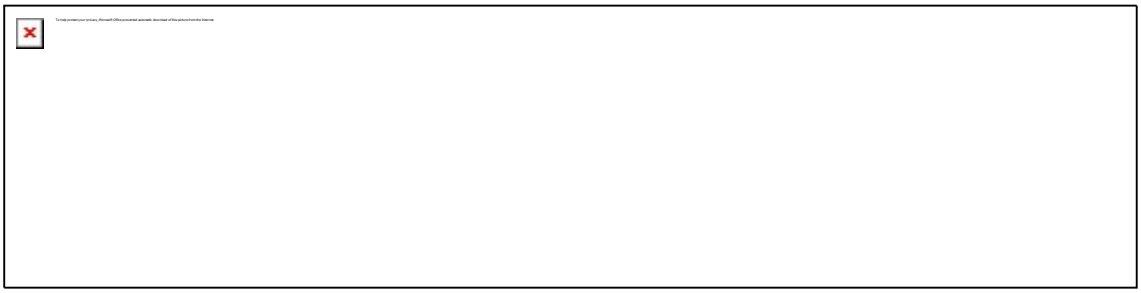
From: Marketing Mailbox <marketing@wpl.co.uk>
Sent: 12 August 2020 16:11
To: Becky Belton <becky.belton@wpl.co.uk>
Subject: Fw: 178-20 Donkleywood - Sewerage Treatment Plant

Marketing Mailbox |
f: +44 (0) 2392 242 624
e: marketing@wpl.co.uk

WPL Ltd | Unit 1 Aston Road | Waterlooville | Hampshire | PO7 7UX

WPL's response to COVID-19

We would like to ask all suppliers who normally post their invoices to email them to accounts@wpl.co.uk. Many thank



From: Lee Taylor <ltaylor@bellmunro.co.uk>
Sent: 12 August 2020 13:15
Subject: 178-20 Donkleywood - Sewerage Treatment Plant

Hello,

We're currently working on a drainage design for Donkleywood in Northumberland. The client is planning to build 4No. holiday chalets and discharge to the watercourse on site. We have done a flows and loads calculation as shown below and assumed the occupancy to be 2B+1 rather than B+2 as given in flows and loads, due to the nature of holiday chalets usually having higher occupancy rates

Lodge	Bedrooms	*Occupants B+2*	Occupants 2B+1	Quantity	PE
Forest	2	*4*	5	3	15
Falcon	4	*6*	9	1	9
					24
			Reduction	0.9 x 24	22

Flow	227 x 22	4994 l/day
BOD	94 x 22	2068 g/day
Ammonia	10 x 22	220 N/day

Could you please give me the specification for a private sewerage treatment plant capable of taking the loading above? Assume that there is 230v single phase supply.

If you have any questions or queries please contact us by return email, or by the office details below.

Please note: Starting on Friday 28Aug20 I will be on annual leave, I will return to the office on Monday 07Sep20.

Kind regards,

Lee Kenneth Taylor
BEng(*Hons*), GMICE
Project Engineer

For and on behalf of Bell Munro Consulting (North East) Limited

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Consulting Civil and Structural Engineers
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Please consider the environment before printing this e-mail.

KEE

Specialists in Domestic & Industrial Wastewater Treatment

KEE NuDisc® RBC Technology

- Rotating Biological Contactors

NuDisc® Features and Benefits

Optimal Performance at Lowest Lifetime Cost and Lifetime Warrenty

- KEE Lifetime warranty is available for new installs with a KEE 'Elite' service and maintenance package.
- A self-contained treatment system suitable for small to medium effluent flows up to 70m^3/day in a single piece configuration.
- Capable of producing effluent with BOD <5mg/l, Suspended Solids <5mg/l, Ammonical Nitrogen <1mg/l and Phosphorus as PO_4-P <1mg/l.
- Can be designed and built in a variety of sizes and media specifications to match incoming flow rate requirements and discharge quality consents.
- Fabricated in lightweight, tough and corrosion resistant Glassfibre Reinforced Polyester (GRP).
- 'Plug & Play' system. The NuDisc® unit is simply craned into position and connected to power and inlet/outlet pipes.
- Incorporates KEE Process NuDisc® technology offering substrate and flow balancing.
- Compact unit offering space efficiencies where land is at premium.
- Mechanical/electrical components provide a 100,000 hour L_{10} design life. 30 year design life on all structural components.
- Virtually silent and odour free.
- Offers the lowest lifetime cost when compared to all other systems currently available in the commercial market.
- Stable and reliable 'fixed film' process ensuring consistent performance. Extremely low power consumption and associated carbon footprint. Nutrient removal can be included in new plants from onset or retrofitted to existing plants.
- Low maintenance costs and simple to operate and maintain.
- Handles and maintains performance during peak flow (high usage) conditions
- Enclosed design minimises fly and insect nuisance and offers protection against the weather.
- New, improved final settlement chamber with sludge return system (optional on NuDisc® BA-BF), to reduce solids entrainment in the final effluent.
- NuDisc-R® incorporates an additional option of a built-in or modular Biological Tertiary Filter before discharge enabling outlet flow to be reused for irrigation, toilet flushing or other non-profitable purposes (subject to regulatory approval).
- Sleek, lightweight GRP covers sections give easy and safe access for maintenance.
- Total Sludge Free System available upon request.

When installed, used, operated and maintained in accordance with KEE recommendations and installation guidelines, the NuDisc® offers consistent performance, long life, low carbon footprint and the lowest lifetime cost compared to any other system on the market. KEE also offer a fully managed service and maintenance solution for your plant, tailored to care for and protect your equipment throughout its lifespan.

EASY SHIPPING:

The KEE 1600 NuDisc® being loaded at the docks on its way to Grenada in the Caribbean.

FOR HIRE:

KEE Free standing NuDisc® Single Piece Packaged Plant, easily delivered anywhere.

NuDisc® Treatment Systems

Self-Contained, Single Piece System offering Substrate and Flow Balancing

NuDisc®

Applications and Technology

The NuDisc® offers a reliable, cost effective and low maintenance wastewater treatment solution for a wide variety of locations not connected to mains drainage. KEE manufacture the NuDisc® in a range of sizes designed to serve flows from a single domestic property to a small Housing Estate, Hotel, Office Complex, Leisure and Holiday Park, Hospital, Care Home, Public House, Restaurant, Petrol Forecourt, Industrial or Process Plant, Caravan or Camping site, and many other potential applications.

For larger plants, larger diameter RBCs are available in modular configuration. These modules can be supplied as factory built units in GRP (Glass Reinforced Polyester) tanks with covers or can be installed into concrete tanks built on site. Additionally, separate primary and final settlement tanks can also be installed for larger treatment plants.

Both the NuDisc® range and modular RBC systems can be configured for:

- BOD Removal
- Nitrification
- De-Nitrification
- Ortho-Phosphorus Removal
- Combination of the above
- Wastewater reuse or irrigation (subject to consent)
- Disinfection

(RIGHT)
KEE Nudisc® showing upstream and downstream RBC stages.

(FAR RIGHT)
KEE NuDisc® treating wastewater from a nursing home.

(RIGHT)
KEE Nudisc® serving a cluster of houses.

(BELOW CENTRE, TOP)
KEE NuDisc® installed above ground to reduce installation costs. Soil from the surrounding area is mounded up to the plant to protect against cold weather and provide an effective 'platform' for access. NuDisc® F11 treats Municipal wastewater from 200 PE.

(BELOW CENTRE BOTTOM)
KEE NuDisc® installed at Hassop, Derbyshire.

(ABOVE)
Example of NuDisc® modular configuration. Galbally Wastewater Treatment Plant with Physical Biological Tertiary Filter.

(ABOVE, RIGHT)
BK NuDisc® installed at a Youth Hostel in Norway to treat wastewater to a high degree including nutrient removal (phosphorus reduction down to under 1 mg/l). During Winter this 150 PE Plant treats wastewater from the Caretaker's family of 4 persons only, but in Summer the population can increase to 150 persons and for a short period of 4 to 5 weeks the population peaks to about 200 persons. This plant is installed in a building due to the extreme cold weather in Norway.

Installation

The NuDisc® is normally installed on a concrete slab in an excavation, without the need of any additional site related works.

Once the unit is positioned, levelled and ballasted, the excavation is then backfilled with an appropriate material suitable for the ground conditions, soil stability and water table. Once backfilled, only the low profile cover is exposed above ground level. The inlet and outlet pipes are then connected and the control panel is wired up and that's it, the NuDisc® is ready to treat the wastewater.

The NuDisc® can be adapted for above ground installation if required. This is particularly suitable for temporary site installations such as work camps, hospitals and military bases, or to assist under performing plants or systems during refurbishment.

KEE NuDisc® RBC

Process Overview

The compact NuDisc® system

features an RBC as the biological stage and is configured to reduce the inhibitory effects of household chemicals (such as detergents and cleaning chemicals) on the biological treatment stage.
The unrivalled process stability of the NuDisc® maintains constant effluent quality, despite variations in plant usage and flow rates during the day. By 'smoothing' flow rates and spreading the biological load, the NuDisc® delivers optimum performance for small flows in a single, self-contained, 'Plug & Play' modular unit.

The Rotating Biological Contactor (RBC) is essentially a central shaft with Polypropylene Copolymer Media sheets attached to it which provides the fixed 'home' for the bacteria to live and grow. The RBC is rotated slowly so that a proportion of its surface area is submerged in the effluent at any one time. As the RBC rotates, the surface of the media is subjected alternately to wastewater (sewage) and air. This process promotes an aerobic, biologically active film of micro-organisms (biomass) to become established on each side of the media sheets.

As the biologically active film grows in size, it becomes self-regulating and oxidises the pollutants in the sewage. The micro-organisms use the polluting material (which is measured as Biological Oxygen Demand (BOD) or Ammoniacal Nitrogen or TKN) as a substrate. As they multiply in number, they maintain a specific biomass thickness to ensure optimum process efficiency.

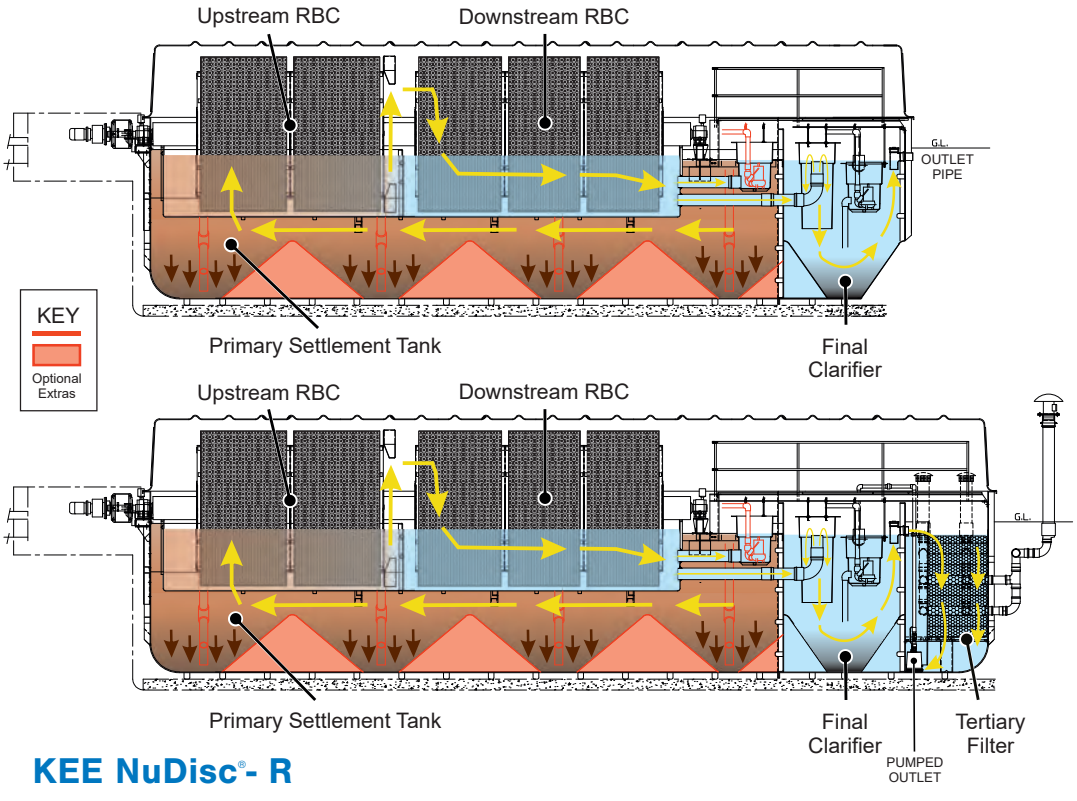
Operation and Maintenance

Regular, competent sludge removal and simple lubrication schedules for bearings and the geared motor will maintain a standard plant at optimum performance.

The KEE range of NuDisc® units offer many advanced features specifically aimed at simplifying operation, maintenance and reducing cost.

For more detailed or technical information on KEE's NuDisc products, please call our KEE Process Team on 01296 634500 or email *sales@keeprocess.com*

KEE NuDisc®



KEE NuDisc®- R

Specialists in Domestic & Industrial Wastewater Treatment

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Ref: CM/20/08/10888

17 August 2020

Bell Munro Consulting
Consulting Civil and Structural Engineers
J29 The Avenues
Eleventh Avenue North
Team Valley Trading Estate
Gateshead
Tyne & Wear
NE11 0NJ

For the attention of Lee Kenneth Taylor

Dear Lee

Re: Donkleywood

Further to your email dated 17th August 2020, we thank you for the opportunity to quote and are pleased to offer our proposals as detailed below.

Please refer to the attached enquiry sizing sheet detailing our estimates in daily flow and BOD_5 load. If you believe we need to make any adjustment to these figures, please advise and we will reassess our proposals.

For this application, basing our design on achieving a final effluent discharge standard of not more than 20mg/l BOD_5, 30mg/l Suspended Solids and 20mg/l ammoniacal nitrogen on a

95%ile basis, we offer our KEE01HR NuDisc®. This is a single piece plant incorporating a primary settlement zone, managed flow rotating biological contactor and final clarifier with sludge return pump facility.

The plant is compact, offering economical installation costs and because the unit is operated using a 0.12kW motor, running costs are extremely low.

The KEE01HR NuDisc® is a fourth generation RBC sewage treatment package now incorporating a direct drive mounted gearbox and GRP covers fitted with inspection hatches.

To satisfy current Environment Agency guidelines, we include, within our quotation, for a sampling chamber to suit the outlet invert.

As we have not been provided a discharge consent for the site we have based our proposal on a 20/30/20 standard as detailed above. Should this prove not to be the correct standard then please forward when available, and we will revise our proposal to suit.

We attach our quotation together with drawings and technical data sheets for you to assess our proposals and if we can be of any further assistance please do not hesitate to contact the undersigned.

Yours sincerely
KEE Process Ltd

Carlos Mateus
Sales

KEE PROCESS LTD

Quotation

Client: Bell Munro Consulting **Date:** 17 August 2020

Site: Donkleywood **Ref:** CM/20/08/10888

1 № KEE01HR NuDisc® wastewater treatment plant
complete with GRP covers and electrical controls
Price: £13,250.00 Delivered

1 № Sample Chamber
Price: £295.00 ex works

Terms and Conditions

Availability:	12-16 weeks from date of receipt of official order and/or full and final agreement of technical and financial detail, whichever is the later. **This delivery period is subject to confirmation at time of order**.
Validity of Quotation:	This quotation is open for a period of 90 days from date of issue.
Terms of Payment:	30% non-refundable deposit with order, 70% balance on notification that the equipment is ready for delivery, unless agreed otherwise.
Documentation:	1 copy of a general arrangement drawing will be provided for approval; 3 copies of maintenance manual will be provided with the equipment.
VAT:	VAT is excluded from the above prices and will be additional to invoice at the rate current at invoice date, if VAT is applicable.
Terms & Conditions:	This quotation is subject to KEE Process Ltd Standard Conditions of sale which are available on request

Enquiry Sizing Sheet

Our Ref:	CM/20/08/10888	Date:	17 August 2020
Client:	Bell Munro Consulting	Site:	Donkleywood

Source of Waste		Flow (litres/day)		BOD_5 Load (grams/day)		NH_4-N (grams/day)	
Description	No.	Per Head	Total	Per Head	Total	Per Head	Total
Holiday Chalets	24	227	5448	94	2256	10	240
Totals:			5448		2256		240

Comments:.

1	BOD concentration: Ammoniacal Nitrogen concentration	414 mg/l 44 mg/l
2	Suggested type of plant	KEE01HR NuDisc®
3	Assumes waste disposal units	(not in use)
4	Grease Trap/Separator	(not required)
5	Invert Depth Required	905 mm
6	Effluent Quality: not more than	20 mg/l BOD_5 30 mg/l Suspended Solids 20 mg/l NH_4N
7	Power Supply	Single Phase

Please complete and sign in all instances

Customer:

Date:

KEE Process Limited
College Road North, Aston Clinton, Aylesbury, Bucks HP22 5EZ, UK

PROPOSAL FOR WASTEWATER TREATMENT PLANT

FOR

DONKLEYWOOD

PRESENTED TO

BELL MUNRO CONSULTING

Prepared by Carlos Mateus

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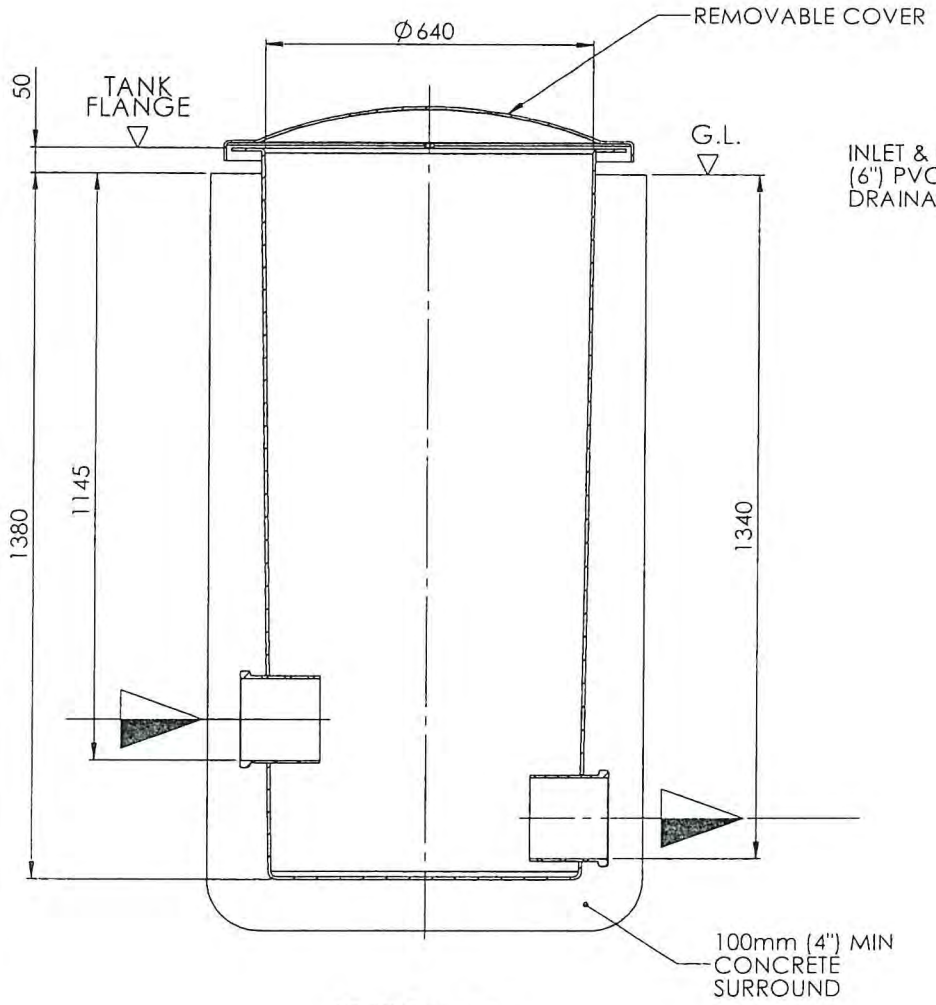
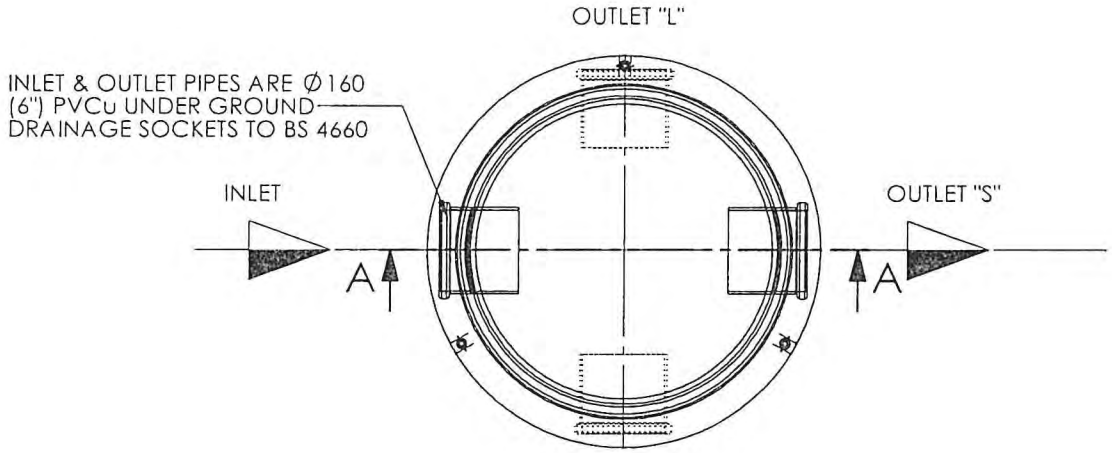
e-mail: carlosm@keeprocess.com



SECTION A-A



ONE OUTLET FITTED
DELETE AS APPROPRIATE

COVER & TANK TO BE FINISHED IN GREEN - 12-B-29

ISSUE	DATE	DRAWN
10		
9		
8		
7		
6		
5		
4		
3		
2		
1	13.09.18	SJS

ALL DIMENSIONS ARE IN MILLIMETRES - DO NOT SCALE

KEE PROCESS LIMITED
COLLEGE ROAD NORTH, ASTON CLINTON,
AYLESBURY, BUCKS, HP22 5EZ
Tel: (01296) 634500

Title:

SAMPLE CHAMBER
TO FOLLOW
KEE 07 TO KEE 50

SCALE: 1:10 | D.O. REF: A3

DRAWING NO: 885185 | ISSUE: 1

THIS DRAWING HAS BEEN PRODUCED USING SOLIDWORKS SOFTWARE

KEE PROCESS RESERVE THE RIGHT TO CHANGE SPECIFICATIONS WITHOUT NOTICE

THIRD ANGLE PROJECTION

Water Management Solutions

Lowest lifetime running costs in the market

Klargester

BioDisc® BD-BN Large Sewage Treatment Plant Range

Proven wastewater treatment solutions for a range of large applications.

Silent operation

Odour free

Fully managed solution

Proven & trusted performance

kingspan.co.uk/klargester

Kingspan

Why choose a Large BioDisc®?

In an increasingly regulated world with new Environment Agency standards, it's more important than ever to choose a sewage treatment plant that delivers peace of mind by guaranteeing proven and reliable treatment of wastewater.

Klargester BioDisc® is built on the back of 70 years' experience and offers the following benefits:

Designed in accordance with BS EN12255

* Subject to regular maintenance by either Kingspan Service or a Kingspan Klargester Accredited Installer and Service Partner.

Low lifetime running costs

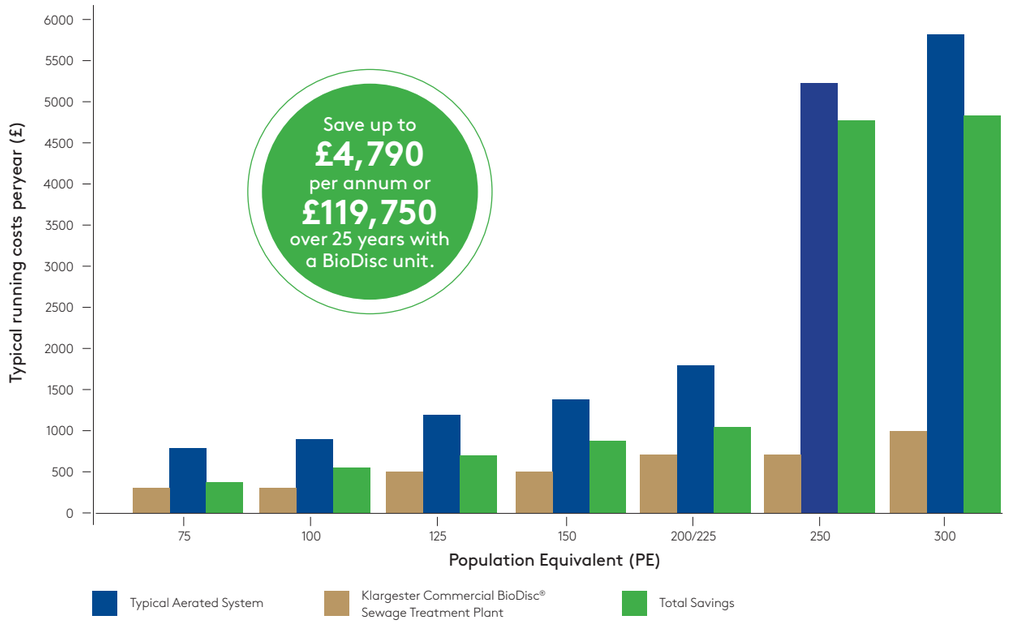
Delivered as a single, packaged system, the Klargester BioDisc® RBC range, offers low running costs due to its unique design and operational efficiencies. A manual air blower system is not required to power the commercial BioDisc, as it instead relies on the proven and patented rotating biological disc which drives the wastewater treatment process in a highly efficient way.

Our range of large treatment plant is designed to run from either a single phase or three phase power source, and require 60 to 550 watt motors, offering the lowest running costs of any treatment plant in their class.

LOW ENERGY

Low energy consumption means lower running costs

BioDisc commercial versus a typical aerated system yearly running costs



To find out more about the cost benefits of choosing the Klargester BioDisc, contact our in-house technical team who are happy to provide guidance on the size and cost of model for your wastewater project.

Email: klargester@kingspan.com
Tel: 01296 633 033
Web: www.kingspan.co.uk/Klargester

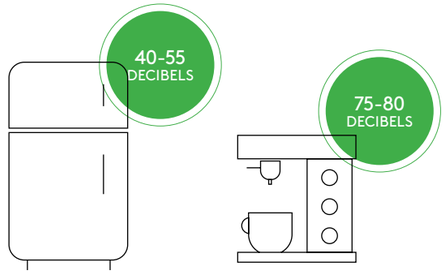
Lowest lifetime running costs in the market

*Larger bespoke schemes available. Please speak to our technical team for details.

Silent performance guaranteed

In contrast with a noisy aerated wastewater treatment system, the Klargester Large BioDisc promises noiseless day to day operation. Whereas an aerated system creates constant noise, the discs of the BioDisc revolve silently. Under test conditions at a recent site, our expert team concluded that commercial BioDisc has the same level of noise as the average ambient background noise outside – between 40-55 decibels.

With clear evidence to prove its silent operation, you can rest assured that the Klargester BioDisc will continue to operate efficiently on site, with absolute minimal disruption to your environment.



Commercial BioDisc
Decibel equivalent to a modern refrigerator

Typical aerated system
Decibel equivalent to a coffee grinder machine

Low noise means minimal environmental impact, zero noise pollution

Proven odourless operation

Kingspan Klargester's Large BioDisc® uses the tried and tested Rotating Biological Contactor technology. This means that it utilises moving discs containing living biomass and a patented flow management system to treat the wastewater, as opposed to an air pump which is used in a traditional aerated system.

BioDisc is one of the only sewage treatment systems available in the UK that does not make use of an air pump. This means minimal odour being omitted as effluent is not aerated or 'blown around' within a system.

This is verified by an independent odour sampling report undertaken at one of our sites in Cumbria, in partnership with H+M Environmental Ltd (April 2017) and in line with BS EN13725 test standards.

The key findings of the report stated:

'No odour was subjectively discernible at the site boundary fence, or within the BioDisc compound'.

- The odour emission rate was calculated by sampling the odour concentration from joins in the unit covers. This was then multiplied by a volumetric air flow.
- Weather conditions were dry and sunny during the sampling.
- Temperatures on the day of sample (18th April) ranged from 8-12oC during the test period.
- The BioDisc operated normally during the sampling with no particular reported operational issues.

Independently tested to BS EN13725 standards

Calculated Odour Emmissions Rates

Source	Measured Odour Concentration	Measured Air Flow	Calculated Odour Emission
	ou_E/m^3	m^3/s	ou_E/s
Air vented from BioDisc 9am	330	0.008	2.7
Air vented from BioDisc 11am	339	0.008	2.7

(Above: extract showing actual calculated Odour Emission Rates from sample report – April 2017. Full report available on request from Kingspan Klargester).

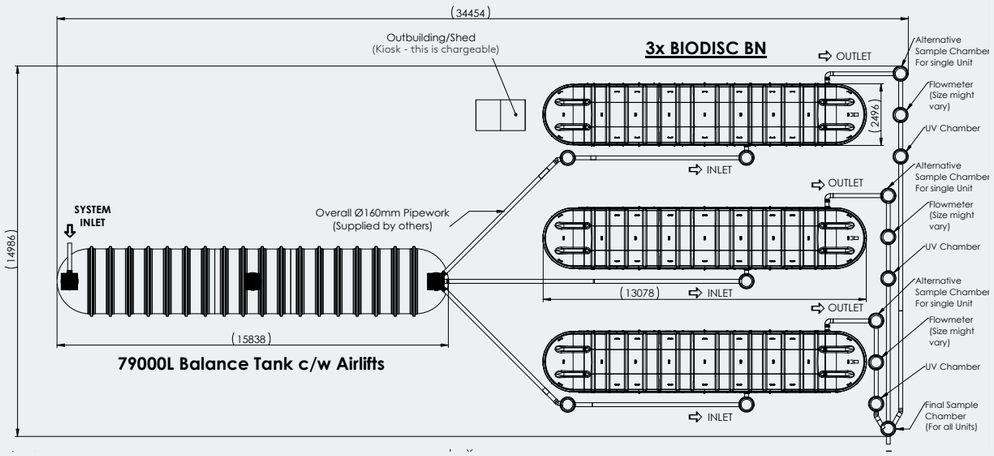
A professional partnership

Kingspan Klargester provide relevant advice and support throughout the wastewater treatment purchasing process based on our in-depth local knowledge and expertise. How? By offering comprehensive free site visits, professional installation options and expert aftersales care through our in-house Service team of engineers and our national network of Kingspan Klargester accredited installers and service partners.

Our expert team provides:

- Free on-site consultations, including sizing advice and full engineering expertise
- Full commissioning service on your commercial BioDisc
- Professional installation
- Preventative maintenance plans to ensure optimal ongoing performance
- Day to day technical support.
- Cost effective connectivity with Kingspan's SmartServ Pro remote asset monitoring solution.
- Consultancy and advice, direct from the manufacturer
- A 25 year warranty period (*when you register your warranty online).

As part of our free site visit service, we can offer advice on larger bespoke schemes.



Talk to us about larger bespoke schemes, at klargester@kingspan.com

Technical specifications
How it works

Our patented flow management systems ensure optimum treatment performance in the treatment zones. BioDisc® features two chambers to ensure a totally efficient operation with a unique flow balancing facility.

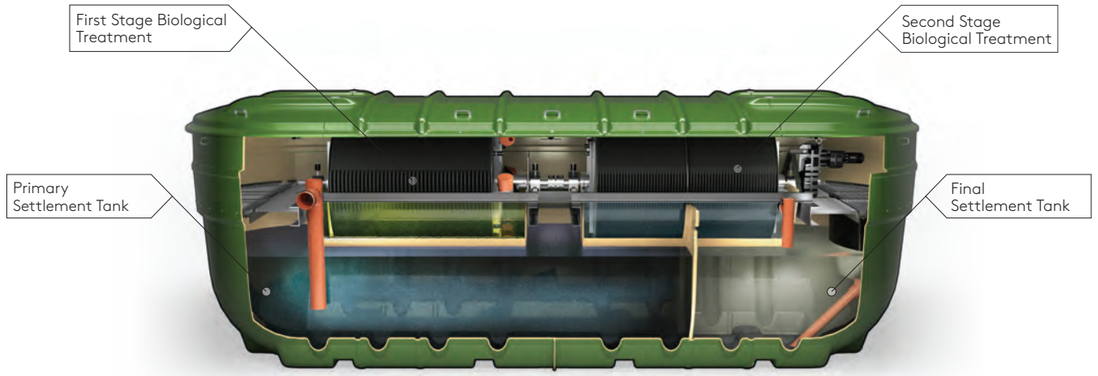
This managed flow system ensures peak performance by smoothing variable loads. Wastewater is moved at a controlled rate through the sections with the entire media area available, ensuring maximum treatment efficiency.

BioDisc® is 100% compliant with national and international regulations such as BS EN12255.

Performance & Compliance

- Odour free - independently tested in accordance with BSEN13725.
- Designed for applications selected in compliance with British Water Code of Practice Flows and Loads.

The Large BioDisc® Wastewater Management Process



01

Primary Settlement Tank

This is the initial stage of treatment and simply involves the retention of coarse solids present in raw sewage and wastewater for subsequent gradual breakdown.

02

First Stage Biological Treatment

The liquor and fine solids then flow into the first stage of Biological Treatment. A unique managed flow system ensures peak performance by smoothing variable loads.

03

Second Stage Biological Treatment

The liquor is then fed forward at a controlled rate into Biological Treatment stage 2 for further cleaning. This process ensures the whole media area available is utilised ensuring maximum efficiency.

04

Final Settlement Tank

The surplus micro-organisms continuously slough off the discs and are carried forward to the final settlement where they settle out as a humus sludge, leaving a clear treated effluent to be discharged to ground or water course.

Technical Specifications

Model Reference	BD	BE	BF	BG	BH	BJ	BK	BL	BM	BN
Maximum Daily BOD (kg)	1.5	2.1	3	4.2	4.5	6	7.5	9	13.5	18
Maximum Daily Flow (m3)	5	7	10	14	15	20	25	30	45	60
Ø/Width (mm)	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
Length (mm)	3340	3340	4345	5235	7755	7755	7755	7755	10420	13100
Inlet Invert depth (mm)	600/1100	600/1100	600/1100	600/1100	600/1000	600/1000	600/1000	600/1000	600/1000	600/1000
Depth Below Inlet Invert (mm)	1820	1820	1820	1820	1790	1790	1790	1790	1790	1790
Outlet Invert Depth (mm)	1735	1735	1720	1720	1640	1640	1640	1640	1640	1640
Overall Height (mm)	2825/3325	2825/3325	2825/3325	2825/3325	2830/3230	2830/3230	2830/3230	2830/3230	2830/3230	2830/3230
Height to Rim of Cover (mm)	2485/2985	2485/2985	2485/2985	2485/2985	2490/2890	2490/2890	2490/2890	2490/2890	2490/2890	2490/2890
Empty Weight (kg)	1100/1200	1200/1300	1315/1465	1660/1810	3000/3020	3100/3120	3200/3220	3300/3320	4200/4250	5500/5650
Standard Power Supply	1 phase	1 phase	1 phase	1 phase	1 phase	1 phase	1 phase	1 phase	1 phase	1 phase
Motor Rating – 1 Phase (Watts)	75	75	120	180	250	250	370	370	550	2 x 370
Full Load Current 1 Phase (amps)	1.1	1.1	1.3	1.6	1.5	1.5	2.35	2.35	2.8	2 x 2.35
Optional Power Supply	3 phase	3 phase	3 phase	3 phase	3 phase	3 phase	3 phase	3 phase	3 phase	3 phase
Motor Rating – 3 Phase (Watts)	90	90	120	180	250	250	370	370	550	2 x 370
Full Load Current 3 Phase (amps)	0.38	0.38	0.42	0.63	0.88	0.88	1.35	1.35	2.8	2 x 1.35
Sludge Return Pump Rating (Watts)	250	250	250	250	250	250	250	250	250	250

Protect your investment with a Kingspan Service plan

A service and preventative maintenance plan will help prolong the life of your Klargester BioDisc system. Our dedicated Kingspan Service team offer a range of cost effective packages, including local and remote monitoring options – installation of a suitable alarm system is required under BS EN 12566-3 (BioDisc BE-BF units only).

To find out more about protecting your investment and ensuring peace of mind, contact us on **helpingyou@kingspan.com**.

Further information is available at Kingspanservice.com

SmartServ Pro
Ask us about SmartServ Pro asset monitoring solution!

Contact Details

UK

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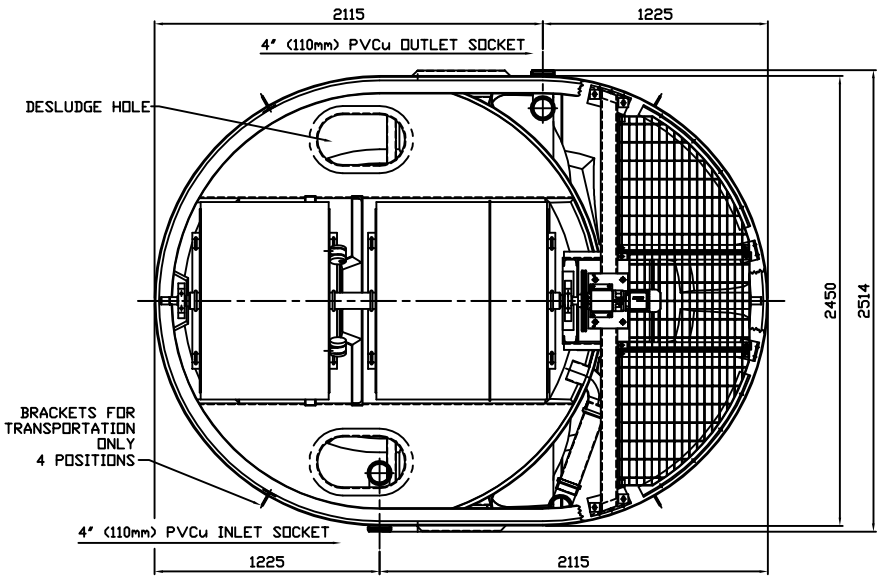
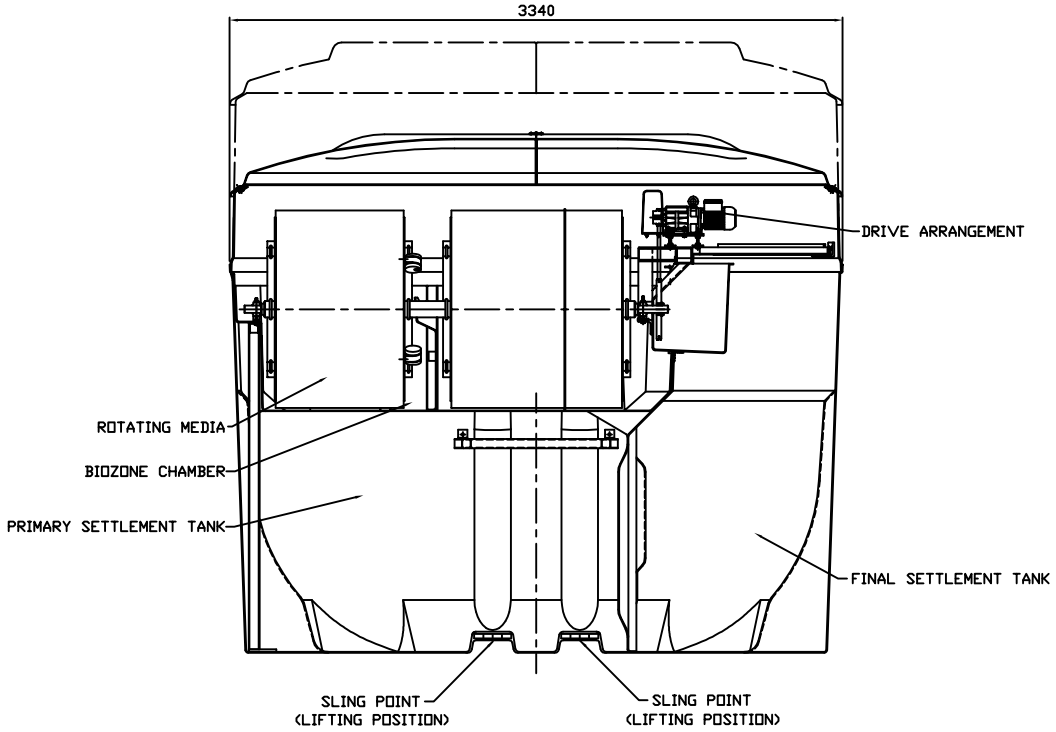
Job Number – 01/2020



PLAN VIEW WITH TOP COVER REMOVED

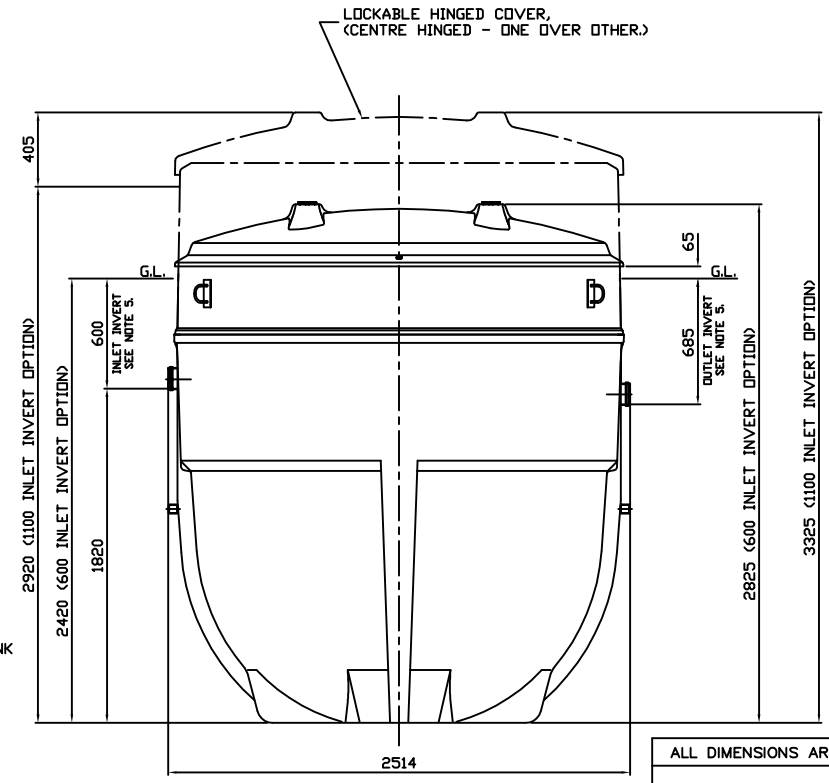
NOTES:-

1. BIODISC TANK & COVER ARE MANUFACTURED IN GLASS REINFORCED PLASTIC (G.R.P.), COVER IS FINISHED IN GREEN TO BS 4800 TINT 12:B:25
2. ELECTRICAL SUPPLY:- 240 VOLTS, 2 AMPS, SINGLE PHASE (THREE PHASE OPTIONAL), CONTROL PANEL SUPPLIED.
3. MOTOR POWER (SINGLE PHASE = 75 WATTS / FLC = 1.1 AMPS) (THREE PHASE = 60 WATTS / FLC = 0.35 AMPS)
4. BIODISC MUST ONLY BE LIFTED USING WEBBING SLINGS OF A SUITABLE SPECIFICATION, AT THE LIFTING POINTS PROVIDED.
5. FOR INSTALLATION, OPERATION, MAINTENANCE & DESLUDGE DETAILS REFER TO PROCEDURE DOCUMENTS SUPPLIED WITH UNIT.
6. 600 INLET INVERT UNIT OPTION SHOWN. 1100 INLET INVERT / 1185 OUTLET INVERT OPTION AVAILABLE.
7. THIS DRAWING IS ALSO AVAILABLE ON OUR WEBSITE www.klargester.com



COVER, TOP SECTION, BASE & BIOZONE TANK SECTIONED ON CENTRE LINE FOR CLARITY.

END ELEVATION



APPROX. DRY WEIGHTS (Kg)	BD	BE
600mm INVERT	1100	1200
1100mm INVERT	1200	1300

ISSUE	DATE	DRAWN	MODIFICATION
03	24/04/15	L.S	CC1235 – INLET/ OUTLET DIM'S FOR BD–BL BIODISC'S
02	19/11/12	L.S	CC1104
01	16.10.09	M.H.	INITIAL ISSUE

THIRD ANGLE PROJECTION

ALL DIMENSIONS ARE IN MILLIMETRES – DO NOT SCALE

Kingspan Environmental

TITLE: BD/BE BIODISC GENERAL DIMENSIONS CUSTOMER DRG

SCALE 1:15 | SHEET SIZE A1

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GL0015P
INSTALLATION GUIDELINES FOR BIODISC® UNITS BD, BE, ND & NE

Kingspan Environmental

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Enclosed Documents

510101	BD & BE Single Phase Wiring Diagram
DS0468P	BioDisc General Dimensions
The following wiring diagrams are provided with in the control panel housing. If additional copies are required contact Kingspan.	
510009	BD & BE Single Phase Control Panel (Option L/M)
510030	BD & BE 3 Phase Control Panel Wiring Diagram
510003	BD & BE 3 Phase Alarm Control Panel Wiring Diagram
510012	ND & NE Single Phase Panel Wiring Diagram
510013	ND & NE Single Phase Panel (Option L /W)
510006	ND & NE Three Phase Panel Wiring Diagram
510007	ND & NE Three phase Alarm
510018	Independent Loss of Rotation Alarm

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 Guide-Lines 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 drive chains or 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). Desludge port covers, where fitted, must be replaced if removed.

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 Operating Manual, a copy of which is fastened under the covers.

CONTENTS

1.0 Introduction

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). The unit should be commissioned by an approved engineer.

2.0 Handling & Storage

2.1. Care must be taken to ensure that the unit is not damaged during delivery and handling on site.

2.2. 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 collect also 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.

2.3. When lifting the unit, use webbing slings of a suitable specification, which must be attached to the designated lifting points.

2.4. Do not use chains.

2.5. Lifting equipment should be selected by taking into account the unit weight, length and the distance of lift required on site.

2.6. Kingspan Environmental accept no responsibility for the selection of lifting equipment.

2.7. Whenever Kingspan BioDisc units 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.

3.0 Site Planning

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

3.1. The discharge must have the consent of the relevant Environmental Regulator.

3.2. The installation should have Planning and Building Control approval.

3.3. 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.

3.4. 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.

3.5. 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.

3.6. The unit should be installed so that the bottom lip of the cover is 65mm 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.

3.7. There must be at least 1 metre of clear, level ground all around the unit to allow for routine servicing.

3.8. The unit should be installed as far as possible from any habitable building. Many Local Authorities will insist on a minimum distance of 15 metres. Care should be taken not to place the unit in close proximity to any openings within habitable buildings

3.9. The drainage system connecting 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.

3.10. Adequate access must be provided for routine de-sludging and maintenance. Vehicles should not be permitted within a distance equal to the depth of the unit, unless suitable structural protection is provided to the installation.

3.11. 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.

3.12. An adequate electrical supply must be provided, complying with current electrical regulations. The electrical details in Section 6.2.6.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 1.5sq mm 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.

3.13. Pump stations or any other associated equipment should have a separate power supply.

3.14. 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.**

3.15. 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.

4.0 Installation - General

4.1. When units are installed in unstable ground conditions where movement of the surrounding material and/or unit may occur, the connecting pipework should be designed to minimise the risk of damage from differential movement of the unit(s) and/or surrounding material.

4.2. In situations where the excavation will not maintain a vertical wall, it will be necessary to support side walls of the excavation (eg. 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.

4.3. 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.

4.4. 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.

4.5. A water supply must be available on site to enable the unit to be ballasted during backfilling.

4.6. The Concrete Specification is a *general* specification. It 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		

5.0 BioDisc Installation

5.1. The package tied to the outside of the unit, contains this Installation Guideline and a cover key.

5.2. Excavate a hole of sufficient length and width to accommodate the unit and a minimum of 150mm concrete surround and to a depth which allows for the burial depth of the unit plus a minimum 150mm thick concrete base.

5.3. Construct a suitable concrete base slab, a minimum of 150mm thick, appropriate to site conditions. In wet or unstable ground conditions it may be necessary to lay a hard-core sub-base (see notes 3.3 & 4.3). Ensure that the slab is flat and level. Allow the slab to set sufficiently to support the installed load, but not so much as to prevent subsequent backfill bonding fully to the base.

5.4. 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.

5.5. Remove the covers by undoing the locks and folding the covers before lifting them off.

5.6. Remove the Control Panel and Owners Pack from the inside the unit.

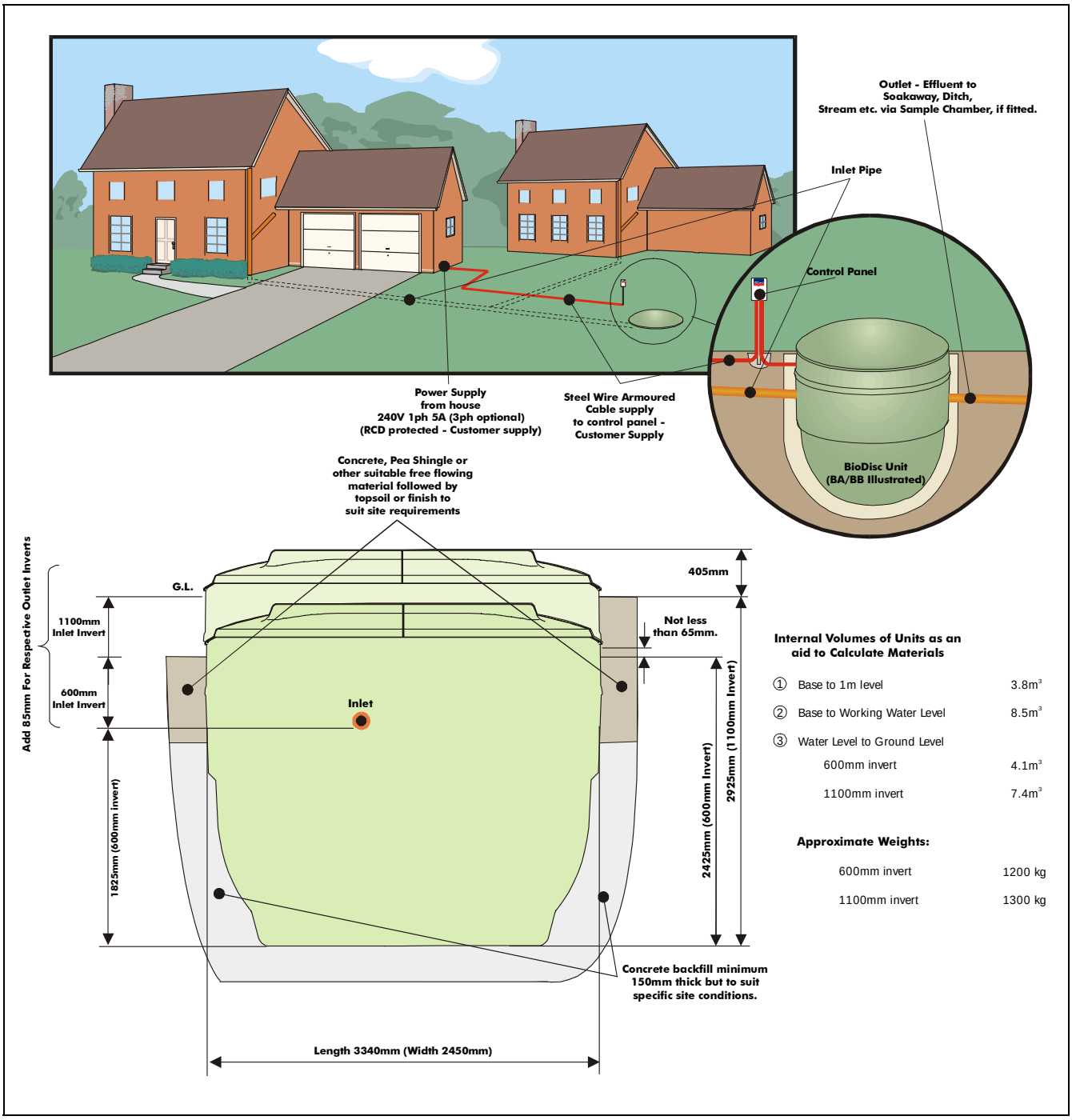
5.7. Check that the inlet and outlet orientation is correct and that the unit is level. It is essential that the unit is installed in a level plane to avoid undue stress on the bearings.
The rotor shaft must be level end to end, to within ±3mm, measured at the bearing caps or directly on the shaft.
The unit must also be level to within ±5mm from side to side, measured at the GRP 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.

5.8. It is essential that levels given above 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 5.7.

5.9. Pour no more than 1 metre depth of water into the primary (inlet) chamber and the final (outlet) chamber, ensuring there is never more than 250mm difference in water level between any of the sections.

5.10. Place concrete backfill to approximately 500mm above the unit base, ensuring good compaction to avoid voids. **Do not use vibrating pokers.**

5.11. Continue backfilling with concrete up to the level of the outlet. Keep the concrete at an even level all round the unit, compacting in layers. As backfilling proceeds keep the ballast water level inside the unit 200-250mm above the backfill level, but do not attempt to fill the unit with water above the outlet level.



5.12. Connect the inlet and outlet pipework when safe access can be gained. Short lengths of “rocker” pipe with flexible joints should be used adjacent to the unit to allow for any minor differential movement.

5.13. Check the cables attached to the Control Panel and drill the corresponding number of 40mm holes in the BioDisc case, 100mm below ground level and adjacent to one end of the baffle supporting the Motor/gearbox. If an Independent Remote Alarm is to be fitted this will also require a 40mm hole.

5.14. Erect the Control Panel as described in Section 6.0.

5.15. Continue to backfill, with concrete or free flowing granular material, up to ground level. The finished surface should be 65mm minimum lower than the lip of the cover.

5.16. **Important : Read section 8.2 regarding delayed electrical installation**.

6.0 Control Panel Installation

6.1 General Installation

6.1.1. The control panel should be positioned adjacent to the unit, so that:

a) It does not interfere with cover removal.
b) It is convenient for the incoming power supply.
c) It cannot be reached by someone standing in or on the BioDisc unit.

d) It is close enough to enable the electrical connections to be made in the BioDisc.

This usually indicates a panel position about 1.5 metres distance from the BioDisc.

6.1.2. Set the panel leg(s) in a concrete base, minimum 250mm thick and prop the panel to prevent movement until the concrete has set. Allow 350mm minimum clearance from ground level to the bottom of the panel.

6.1.3. Control panels are supplied with pre-fitted steel wire armoured (s.w.a.) cable(s), complete with grommets and glands. Lay the cable(s) in a 500mm deep trench and bed them on a layer of sand or similar soft material.

6.1.4. Insert the cables through the hole(s) in the casing of their respective unit(s), using the grommets supplied. Leave the cable(s) temporarily secured above water level pending electrical installation.

6.1.5. Cover the cable(s) with a layer of sand or similar soft material and warning tape Backfill the cable trench with graded spoil, free of large stones or any other material which might damage the cable(s).

6.1.6 The Control Panel key is in the protective bag at the end of the motor/gearbox cable.

6.2 Electrical Installation

6.2.1. Depending on type, the control panel is supplied with between one and three pre-fitted armoured cables.

a) Every Control Panel has a motor/gearbox cable.

b) Control Panels for ND and NE units have an additional Sludge Return Pump cable.

c) Alarm Control Panels have an extra cable for the Loss of Rotation sensor.

Each cable is fitted with a gland for connection to the terminal box or junction box and a grommet for entry into the BioDisc case.

6.2.2. Refer to the wiring diagram attached and connect the cable(s) to the appropriate electrical junction(s) in the BioDisc, fitting the glands supplied. The cables can be identified by their numbered end connectors which correspond to connection points in the BioDisc. The end numbers on the motor/gearbox cable correspond with the numbered terminals in the motor/gearbox terminal box.

6.2.3. Units with an Alarm Control Panel or optional Independent Remote Alarm (used in conjunction with a standard Control Panel) will be supplied with a fixing kit. Install the kit in accordance with the installation instructions provided. Please note that the Remote Alarm Unit should not be installed more than 100 metres from the BioDisc and that the interconnecting cable (customer supply) should be laid in a separate trench to prevent electrical interference.

	Connection Point	Connector Type	End Numbers
Motor/Gearbox	Motor/Gearbox Terminal Box	Pin	Three Phase : L1, L2, L3, Earth
			Single Phase : 1, 3, Earth
Sludge Return Pump	Junction Box fixed inside BioDisc Case	Pin	L1, N1, Earth
Loss of Rotation Alarm	Junction Box fixed to Motor Support Beam	Pin	6, 7, Earth

6.2.4. Ensure that cables inside the BioDisc are securely tied to the structure, clear of the drive arrangement and do not present a trip hazard.

6.2.5. Connect the incoming power supply to the control panel, using suitable cable and current overload protection (See section 3.11.) Ensure that the panel is securely closed.

		Full Load Current (Amps)			
		BD	BE	ND	NE
Motor	240 volt single phase	0.92	1.15	0.92	1.15
	415 volt three phase	0.33	0.37	0.33	0.37
Sludge return pump	240 volt single phase only	N/A	N/A	2.4	2.4

7.0 Ancillary Equipment

Ancillary items should be installed in accordance with the Installation Guide supplied e.g.

Crude Sewage Pump Station, Effluent Pump Station, Effluent Sample Chamber, Grease trap.

8.0 Start Up

8.1. Refer to the Owners Handbook for details of the Start Up Procedure. We recommend that the unit is commissioned using an approved engineer.

8.2. Once the unit has been installed it should be left filled with water. Please switch on the motor, following the procedure in the Owners Handbook 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 drive belt/chain and store in a dry or heated environment until such time as the unit is ready for permanent operation.

CE

ETS Ltd
Trading as: Kingspan Environmental
College Road North
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%**
	BOD_5: 96%
	SS: 95%
	Total P: 48%
	NH_4: 89%
	Total N: 46%
Electrical consumption:	**1.3 kWh/d - 3.1 kWh/d**
Sludge production:	**0.21 litres per person per day**

Lee Taylor

From: Les Clark <les.clark@kingspan.com>
Sent: 10 September 2020 11:31
To: Lee Taylor
Cc: KEC ASM Quotes
Subject: RE: Donkleywood, Northumberland

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Lee,

BE Biodisc, 600mm invert-£11,665

BE Biodisc, 1100mm invert-£12,427

Many thanks,

Les

Les Clark
Area Sales Manager
Kingspan Klargester
M: +44 7771 854357 | **F:** +44 1296 633001

From: Lee Taylor <ltaylor@bellmunro.co.uk>
Sent: 10 September 2020 11:23
To: Les Clark <les.clark@kingspan.com>
Subject: RE: Donkleywood, Northumberland

Hello Les,

Cheers for that, could you also get the price for us?

If you have any questions or queries please contact us by return email, or by the office details below.

Kind regards,

Lee Kenneth Taylor
BEng(*Hons*), GMICE
Project Engineer

For and on behalf of Bell Munro Consulting (North East) Limited

BMC

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Please consider the environment before printing this e-mail.

From: Les Clark <les.clark@kingspan.com>
Sent: 10 September 2020 10:52
To: Lee Taylor <ltaylor@bellmunro.co.uk>
Subject: RE: Donkleywood, Northumberland

Hi Lee,

Good to talk to you earlier.

Please find your spec sheet for the BE Biodisc as discussed

Many thanks,

Les

Les Clark
Area Sales Manager
Kingspan Klargester
M: +44 7771 854357 | **F:** +44 1296 633001

From: Lee Taylor <ltaylor@bellmunro.co.uk>
Sent: 10 September 2020 10:33
To: Les Clark <les.clark@kingspan.com>
Cc: KEC ASM Quotes <kec.ASM.quotes@kingspan.com>; Chris Pike <chris.pike@kingspan.com>
Subject: RE: Donkleywood, Northumberland

Hello Les,

We've had to change a few bits and the loading has been affected

Flow	227 x 24	5.49 m3/day
BOD	94 x 24	2.26 kg/day
Ammonia	10 x 24	240 g/day

The 24PE chalet is approximately equal to 36PE domestic. Can you confirm if the BD is still applicable?

If you have any questions or queries please contact us by return email, or by the office details below.

Kind regards,

Lee Kenneth Taylor
BEng(*Hons*), GMICE
Project Engineer

For and on behalf of Bell Munro Consulting (North East) Limited

BMC

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Tel (Office): 0191 487 8214
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Mob (Personal): 0749 585 2850
Email: ltaylor@bellmunro.co.uk

Please consider the environment before printing this e-mail.

From: Les Clark <les.clark@kingspan.com>
Sent: 09 September 2020 09:15
To: Lee Taylor <ltaylor@bellmunro.co.uk>

Cc: KEC ASM Quotes <kec.ASM.quotes@kingspan.com>; Chris Pike <chris.pike@kingspan.com>
Subject: Donkleywood, Northumberland

Good morning Lee,

Hope you are well, thank you for enquiry for a treatment plant as per your below requirements

We're currently working on a drainage design for Donkleywood in Northumberland. The client is planning to build 4No. **holiday chalets** and discharge to the watercourse on site. We have done a flows and loads calculation as shown below and assumed the occupancy to be 2B+1 rather than B+2 as given in flows and loads, due to the nature of holiday chalets usually having higher occupancy rates

Lodge	Bedrooms	*Occupants B+2*	Occupants 2B+1	Quantity	PE
Forest	2	*4*	5	3	15
Falcon	4	*6*	9	1	9
					24
			Reduction	0.9 x 24	22

Flow	227 x 22	4994 l/day
BOD	94 x 22	2068 g/day
Ammonia	10 x 22	220 N/day

Your will require the following:

BD Biodisc- 600mm invert-£9,262
Or
BD Biodisc- 1100mm invert-£9,848
Kiosk-£650
Commissioning-£199
Optional service bond-£409

Let me know if you require any further information

Many thanks,

Les

Les Clark
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Mobile: 07771 854357

Les Clark
Area Sales Manager

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