

Casita, Beaumaris - Foul Drainage Options and Cost Review

Site: Casita, Allt Goch Bach, Beaumaris, LL58 8AZ

Author: Amy Brooke MSc

Company: Britannia Homes 2 Limited

Date: 5th August 2024

Contents

1. Introduction	3
1.1. Submission History and Comments	3
1.2. Foul Drainage Options Summary	4
2. Foul Drainage Options Review	5
2.1. Option 1 – Private Sewage Treatment Plant	5
2.1.1. GRAF Specification and Phosphate Calculations	5
2.1.2. Soakaway into Neighbouring Land	5
2.1.3. Treatment Plant Costs and Benefits	6
2.2. Option 2 – Connection to Cae Mair Uchaf Public Sewer	6
2.3. Option 3 – Connection to Cae Mair Public Sewer	7
3. Conclusion	9
4. Appendix.....	10
4.1. Appendix A – DCWW Comments to DIS/2023/33	10
4.2. Appendix B – NRW Comments to DIS/2023/33	11
4.3. Appendix C – Option 1 Treatment Plant Specification and Phosphate Calculations ...	12
4.4. Appendix D – Site Plan showing Treatment Plant and Soakaway Location	13
4.5. Appendix E – Treatment Plant Cost Breakdown	14
4.6. Appendix F – Welsh Water Representative Email Confirming Option 2 as Unsuitable ..	15
4.7. Appendix G – Option 3 Public Sewer Connection Cost Breakdown	16

1. Introduction

Britannia Homes 2 is the landowner of the Casita development in Beaumaris. The original planning permission on the site is found under reference 12C49K.

Britannia Homes 2 Limited (applicant) is currently in the process of submitting details in order to obtain approval for Condition 11 of planning permission 12C49M/VAR.

Condition 11 of planning permission 12C49M/VAR states that:

No development shall commence until a 'scheme' for foul, surface and land drainage of the development has been submitted to and approved in writing by the Local Planning Authority. The approved 'scheme' shall be completed and operational before any of the apartments hereby are occupied.

MAO/2021/14 applied for minor amendments to the wording of this condition to allow work to commence before providing drainage information, which was permitted in April 2021.

1.1. Submission History and Comments

Submission: DIS/2023/33 – Britannia Homes 2 applies to discharge Condition 11 with proposals to use a private sewage treatment plant.

DCWW Comments: Welsh Water had no objections to a proposal to discharge foul water flows to an on-site private treatment plant. See Appendix A.

NRW Comments: Natural Resources Wales objected to an on-site private sewerage treatment plant as the site is within a publicly sewered area and therefore it is not normally considered environmentally acceptable to discharge into a package treatment plant if this is the case. Natural Resources Wales requested that the applicant should thoroughly investigate the possibility and feasibility of connecting to the public sewer prior to a treatment plant being considered. See Appendix B.

This report seeks to investigate the feasibility of the various foul drainage options to establish the most appropriate solution in order to lift Condition 11 of the planning permission.

1.2. Foul Drainage Options Summary

Three options were considered for the foul drainage at Casita:

Option 1 – Private On-Site Sewage Treatment Plant

Option 2 – Connection to Public Sewer at manhole 8650 in Cae Mair Uchaf

Option 3 – Connection to Public Sewer at manhole 0701 in Cae Mair

It was determined that the preferable strategy was an on-site private treatment plant due to the manhole in Option 2 being unsuitable to Welsh Water as it is in private land and connects to a 100mm sewer which is considered by Welsh Water too small for the flows generated at Casita, and a connection to the manhole in Option 3 is considered to be unfeasible and unviable in terms of the cost and practicality of connection. These options are discussed further in the next sections.

2. Foul Drainage Options Review

2.1. Option 1 – Private Sewage Treatment Plant

2.1.1. GRAF Specification and Phosphate Calculations

Britannia Homes 2 Limited approached GRAF UK to design a package treatment plant for the 35 apartments and provide technical data on the outputs of the proposed plant in terms of phosphate levels and environmental quality.

GRAF have specified a One2clean Advanced 175 PE wastewater treatment plant. This type of plant can achieve 4mg/l by way of biological treatment, and this can be improved further using additional cleansing such as denitrification programming (+D) and carbon dosing (+C) (a non-chemical solution).

The purely biological treatment process that achieves a 4mg/l P_{tot} in the treated effluent discharge calculation would be as follows:

156 persons x 150 litres x 4mg/l = 93600 mg/l discharged daily. This is betterment verses mains treatment of 23400mg/l per day.

If the additional treatment modules are added, the phosphate calculations are as follows:

156 persons x 150L x 2mg/l = 46800mg/l discharged per say. This is a betterment verses mains treatment of 70200mg/l per day.

These calculations demonstrate the benefits of a treatment plant solution on this project. See Appendix C for treatment plant specifications, phosphate calculations and installation manuals.

2.1.2. Soakaway into Neighbouring Land

The land registry title to Casita, dated 11th May 2007, contains the following clauses that show the landowner of Casita has an easement across the neighbouring agricultural and forested land for the drainage and passage of services:

“12.4.1 the right for the Transferee and its successors in title to the free and uninterrupted passage and running of water, soil, gas, electricity, telephone and other services to and from the Property through the sewers, drains, pipes, channels, watercourses, conduits, cables and wires which now are or may during the period of 80 years from the date hereof be in upon or under the Adjoining land and to make connection with such sewers, drains, pipes, channels, watercourses, conduits, cables and wires or any of them for the purposes of exercising the said right of passage and running of water, soil, gas, electricity, telephone and other services

including (for the avoidance of doubt but without limitation) the right to use the septic tanks on such Adjoining Land and any additional or replacement septic tanks which may be constructed on the Adjoining Land within the period of 80 years from the date hereof.

12.4.2. the full right and liberty for the Transferee and its successors in title at all times with or without vehicles machinery and workmen to enter upon the Adjoining Land on reasonable written notice (except in emergency) in order to construct, lay, cleanse, maintain, inspect, alter, connect, make connections to, replace, relay or repair any such service media referred to in clause 12.4.1 hereof and to erect construct or lay in upon or over or under the Adjoining Land any sewers, drains, pipes, channels, watercourses, conduits, cables or wires whatsoever which are required for the drainage of or for the supply of water, gas, electricity, telephone and other services to the Property”.

The private sewage treatment plant proposals suggest a soakaway into the neighbouring land so any outputs of the treatment plant can flow through the land rather than into the Straits watercourse. Appendix D shows a site plan with the treatment plant location. A soakaway design will be carried out by a qualified engineer after talks with the neighbouring landowner.

2.1.3. Treatment Plant Costs and Benefits

The estimated cost of the treatment plant package, associated soakaway and installation is: **£53,938.40**. A breakdown of the costs for the treatment plant and associated installation works are included in Appendix E.

The apartments at Casita are leasehold, meaning the leaseholders pay an annual service charge to contribute towards the maintenance and running of the communal grounds and services. A property management company has been appointed to set up and manage contracts and the maintenance and servicing package costs of the private treatment plant would be included in the service charge budget so that the costs and management of its upkeep are covered.

Installation of a private sewage treatment plant will have little to no disruption on the local community as there will be no works through any residential land, roads or pavements. The soakaway of treated material into the neighbouring land also overcomes any possibility of contamination to watercourses or the sea. Should the treatment fail, any effluent will pass through the plant into soakaways, rather than into the sea. The cost is also considerably less than the public sewer connections.

2.2. Option 2 – Connection to Cae Mair Uchaf Public Sewer

Britannia Homes 2 Limited contacted Welsh Water to establish the potential connection points to the public sewer. Two connection points were put forward, the first being the manhole and

foul drain closest to the site entrance in Cae Mair Uchaf - Manhole 8650. On-site and desktop investigations determined that as the foul drain run here is only 100mm, it would be unsuitable to connect to, as this size of drain has a maximum capacity of 10 dwelling connections. A Welsh Water representative confirmed that connecting to the 100mm sewer would be unsuitable (see Appendix F).

This manhole and associated pipe runs are also located in the gardens of a private residence. This makes access impractical in terms of easements and permissions that would need to be established, which is a complex and time-consuming process. This location could also have issues with future access for maintenance and repairs as well as landowner resistance and liability issues for potential damage to private property. It was therefore decided that this option would not be investigated in the feasibility study as it would not be possible to connect 35 apartments to this sewer location.

2.3. Option 3 – Connection to Cae Mair Public Sewer

The next option was the second nearest public sewer connection point in the A545 main road to Beaumaris – Manhole 0701. This manhole acts as a junction between a 152mm and a 225mm sewer, which Welsh Water deems acceptable considering the level of flows that will be generated from the development. The Welsh Water representative said that this manhole would be their preferred point of connection for the Casita development (see Appendix F) subject to a hydraulic modelling assessment being undertaken, to establish the level of capacity of Beaumaris' public sewer and whether any reinforcement works would need to be undertaken. Any such reinforcement works would be an additional cost to this exercise.

Connection to this location would involve the installation of a packaged, Welsh Water approved, Type 2 pump station near to the apartments on the development site; approximately 120m of rising main to the site entrance at Allt Goch Bach; and then around 250m of off-site gravity sewer, with associated manholes (best practice, every 50m) to be laid under the roadway on Allt Goch Bach, to the A545 main road, where it connects into manhole 0701.

An estimated cost of the connection would be **£455,441.40**. A breakdown of this price can be found in Appendix G.

Option 3 is not only much more expensive than Option 1 and outside of the budget for the foul connection at Casita, it also presents a number of challenges in terms of practicality and viability. We are told by Welsh Water that in order to submit a S106 to Welsh Water for a connection a public sewer, you have to show evidence of planning permission that relates to this. The current planning permission for Casita states that we have planning permission for an on-site private treatment plant subject to a design being submitted to the council. An amendment to the planning permission would need to be sought so that Welsh Water can consider the foul sewer connection and necessary reinforcement works to the public sewer.

We are told by Welsh Water that they are only obliged to provide a connection to the main sewer system, if planning permission has been granted in this respect.

Before a connection can be established, a 6-9-month hydraulic modelling assessment (HMA) needs to be carried out to establish the capacity of the public sewer. The current estimated cost of the HMA is £13,208.53. A further 6-9-month period would then be required for reinforcement works predicted by DCWW, due to issues associated with the Victorian sewage system and old pump station on West End in Beaumaris. It is anticipated that it will therefore be a long, impractical, expensive and complex scenario, outside the control of a third-party developer, and before the construction works for the actual connection commence.

It is also likely to cause significant disruption to the local community. As the road from the site to the sewer connection in Cae Mair is narrow, with the width varying from 4.1m to 4.9m, it will involve the closure of the road during the construction phase. As the length of the sewer to be constructed is 230m, the duration of the road closure is estimated to be 12 weeks. This will cut off a number of residential homes and Baron Hill Golf Club from the main road, causing issues for emergency services and vulnerable residents. This sewer will also have to be adopted by Welsh Water which is another expensive and complex legal process.

There are also environmental concerns associated with this option. Transportation and disposal of the large quantities of excavated road material to an off-site landfill site is not environmentally beneficial. Welsh Water Type 2 pumping stations are susceptible to malfunctions and pump failures. In this scenario, high level overflows are installed in the pump stations which can lead to raw sewage being discharged into nearby watercourses, i.e. The Menai Strait. This can pose significant environmental contamination issues.

3. Conclusion

After considering the feasibility and practicality of the various foul drainage options, the preferred option would be the installation of a private treatment plant with soakaway of the treated material into the neighbouring land. This option would cause the least disruption to the local community, stay within the construction budget, be achieved in quicker time scales and generally be more practical for the nature of the site and its location.

4. Appendix

4.1. Appendix A – DCWW Comments to DIS/2023/33



Dŵr Cymru
Welsh Water

Developer Services
PO Box 3146
Cardiff
CF30 0EH

Tel: +44 (0)800 917 2652
Fax: +44 (0)2920 740472
E.mail: developer.services@dwrcymru.com

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E.bost: developer.services@dwrcymru.com

Isle of Anglesey County Council
Swyddfa'r Sir
Llangefni
LL77 7TW

Date: 24/05/2023
Our Ref: PLA0072899
Your Ref: DIS/2023/33

Dear Sir/Madam,

Grid Ref: SH597754 259846 375527

Site: Casita, Allt Goch Bach, Beaumaris, Anglesey

Development: Application to discharge condition (11) (Drainage Details) of planning permission VAR/2021/90 (Erection of 35 residential apartments)

We refer to your planning consultation relating to the above site, and we can provide the following comments in respect to the proposed development.

SEWERAGE

Dwr Cymru Welsh Water (DCWW) were consulted on the original application (Ref: VAR/2021/90) and by response (Ref: PLA0062320) offered no objection to the variation of conditions to enable amended plans subject to maintaining condition 11 on any new consent. Our response advised there is a lack of capacity in the local public sewerage system to accommodate foul water flows from the development site. We note that the application was approved and includes condition 11 which requires the submission of a drainage scheme.

As part of this latest application for discharge of condition 11, we acknowledge receipt of a 'Proposed Drainage Layout' (Drawing No. ECL.9495.D05.001) which indicates proposals to discharge foul and surface water flows to the an on-site private treatment plant and adjacent surface water body respectively. Therefore, in principle, we offer no objection to this application for discharge of condition 11 on planning permission VAR/2021/90, subject to consultation with the appropriate regulatory body.

glas
Glas Cymru Cyfyngedig

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Mae Dŵr Cymru yn eiddo i Glas Cymru – cwmni 'nid-er-elw'.

We welcome correspondence in
Welsh and English

Dŵr Cymru Cyf, a limited company registered in
Wales no 2366777. Registered office: Pentwyn Road,
Nelson, Treharris, Mid Glamorgan CF46 6LY

Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng
Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn
Nelson, Treharris, Morgannwg Ganol CF46 6LY.

Our response is based on the information provided by your application. Should the proposal alter during the course of the application process we kindly request that we are re-consulted and reserve the right to make new representation.

If you have any queries please contact the undersigned on 0800 917 2652 or via email at developer.services@dwrcymru.com

Please quote our reference number in all communications and correspondence.

Yours faithfully,

Sion Jones
Development Planning Officer
Developer Services

glas
Glas Cymru Cyfyngedig

Welsh Water is owned by Glas Cymru – a 'not-for-profit' company.
Mae Dŵr Cymru yn eiddo I Glas Cymru – cwmni 'nid-er-elw'.

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Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng
Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn
Nelson, Treharris, Morgannwg Ganol CF46 6LY.

4.2. *Appendix B – NRW Comments to DIS/2023/33*



**Cyfoeth
Naturiol
Cymru
Natural
Resources
Wales**

Ein cyf/Our ref: CAS-218174-Q3Q7
Eich cyf/Your ref: DIS/2023/33

Maes Y Ffynnon,
Penrhosgarnedd,
Bangor,
Gwynedd
LL572DW

Isle of Anglesey County Council,
Council Offices,
Llangefni,
Ynys Mon,
LL77 7TW

ebost/email:
northplanning@cyfoethnaturiolcymru.gov.uk

26/05/2023

Dear Sir/Madam,

PROPOSAL: APPLICATION TO DISCHARGE CONDITION (11) (DRAINAGE DETAILS) OF PLANNING PERMISSION VAR/2021/90 (ERECTION OF 35 RESIDENTIAL APARTMENTS)

LOCATION: CASITA, ALLT GOCH BACH, BIWMARES

Thank you for consulting Cyfoeth Naturiol Cymru / Natural Resources Wales about the above, which we received on 18th May 2023.

We have concerns with the application as submitted. We do not recommend your Authority discharges condition 11 for the following reasons.

Condition 11 - Foul Drainage
Foul drainage

We note that the intention is to dispose of foul drainage to a private sewerage system, i.e. package treatment plant. According to our records, the proposed development is located within a publicly seweraged area. The installation of private sewage treatment facilities within publicly seweraged areas is not normally considered environmentally acceptable because of the greater risk of failures leading to pollution of the water environment compared to public sewerage systems.

Section 6.6.21 of Planning Policy Wales states 'Any development discharging domestic sewage should connect to the foul sewer where it is reasonable to do so. Development proposing the use of non-mains drainage schemes will only be considered acceptable where connection to the main sewer is not feasible...'

Government guidance on private sewerage in Welsh Government Circular 008/2018 stresses that the first presumption must be to provide a system of foul drainage discharging into a public sewer. Only where having taken into account the cost and/or practicability it can

be shown to the satisfaction of the local planning authority that connection to a public sewer is not feasible, should non-mains foul sewage disposal solutions be considered.

We therefore advise the Applicant to either amend their proposals to ensure that the foul drainage is connected to the mains sewerage system or provide detailed evidence to demonstrate that it is not reasonable to connect.

The Applicant should thoroughly investigate the possibility of connecting to the foul sewer by taking the following steps:

- Approach the sewerage undertaker to reach an agreement for a connection to the foul sewer.
- If the sewerage undertaker refuses connection to the public sewer, request that they adopt the proposed treatment system.
- If the sewerage undertaker refuses both of the above, you must appeal the refusal with Ofwat.

For further details please see [Natural Resources Wales / Private sewage treatment in an area with a public sewer](#)

The Applicant should be aware that should a connection to the mains sewer not be feasible, they will also need to demonstrate that the proposal would not pose an unacceptable risk to the water environment. Welsh Government Circular 008/2018 advises that a full and detailed consideration be given to the environmental criteria listed under paragraph 2.6 of the Circular, in order to justify the use of private sewerage.

As stated above, we expect developers discharging domestic sewage to connect to the public foul sewer where it is reasonable to do so. We will not normally grant a discharge permit for a private sewage treatment system where it is reasonable to connect to the public foul sewer. We also expect discharges of trade effluent to connect to the public foul sewer where it is reasonable to do so and subject to the sewerage undertaker granting a trade effluent consent or entering into a trade effluent agreement.

Applicants wishing to operate a private sewerage system will need *either* to apply to us for an environmental permit *or* register with us for an exemption from the permit requirement. Septic tanks and small sewage treatment works that meet certain criteria may be registered as exempt.

A step by step guide to registering an exemption can be found on our [website](#).

If the septic tank or private sewage treatment system is not eligible for an exemption, the Applicant will need to apply for an environmental permit, further details can be found [here](#). Should a permit be required further information may be needed as part of that application process. The Applicant is therefore advised to contact us for pre-application advice at the earliest opportunity to try to ensure that there is no conflict between any planning permission granted and the permit requirements. Further details on how to access our pre-application advice service can be found [here](#).

It is important to note that a grant of planning permission does not guarantee that a permit will be granted. A proposal may be deemed unacceptable either because of environmental risk or because upon further investigation, a connection to mains sewer was feasible. Applicants are encouraged to ensure they have all the required permissions, consents, permits and any other approvals in place prior to commencement of works on the site.

Please note, a lack of capacity, or plans to improve capacity in the sewer, is not a valid reason for a sewerage undertaker to refuse connection under Section 106 of the Water Industry Act 1991 and we may refuse to issue an environmental permit or exemption for private treatment facilities in such circumstances.

Where private sewage treatment/disposal facilities are utilised, they must be installed and maintained in accordance with British Standard 6297 and Approved Document H of the Building Regulations. We also refer the Applicant to Guidance for Pollution Prevention 4 on the NetRegs [website](#), which provides further information.

If, following full consideration of the above, the use of private sewerage is justified, then the following comments on 'Protected Sites' should be addressed. If private sewerage cannot be justified, amended plans will need to be submitted which demonstrate that the proposed development will connect to the mains sewer.

Protected Sites

The proposal is located within close proximity to the Menai Strait and Conwy Bay Special Area of Conservation (SAC).

We have concerns that a significant effect from the proposed development on the SAC cannot be ruled out. We advise that further information is required to adequately consider the potential impacts on the features of the SAC and in particular to enable your Authority to carry out a Habitats Regulations Assessment under Regulation 63 of The Conservation of Habitats and Species Regulations 2017 (as amended).

The proposal as submitted proposes foul discharge to a private treatment plant. If the use of private sewerage is justified (see Foul Drainage section above), then the environmental effects of any foul discharge must be fully assessed. We consider that any discharge could affect the sensitive features of the SAC. If private sewerage is justified then detailed proposals of the proposed drainage method should be provided along with a full assessment of potential effects on the SAC features.

As the competent authority under the Conservation of Habitats and Species Regulations 2017 (as amended), your authority must, before deciding to give consent for a project which is likely to have a significant effect on a SAC/SPA/Ramsar site, either alone or in combination with other plans or projects, make an appropriate assessment of the implications of the project for that site in view of its conservation objectives. You must for the purposes of the assessment consult NRW and have regard to any representations we make within such reasonable time as you specify. In the absence of that assessment, NRW cannot advise that the proposals would not result in an adverse effect upon the SAC/SPA/Ramsar site.

Surface Water Drainage

We have no comment to make on the discharge of surface water drainage aspect of the condition.

Other Matters

Our comments above only relate specifically to matters included on our checklist, *Development Planning Advisory Service: Consultation Topics* (September 2018), which is published on our [website](#). We have not considered potential effects on other matters and do not rule out the potential for the proposed development to affect other interests.

We advise the applicant that, in addition to planning permission, it is their responsibility to ensure they secure all other permits/consents/licences relevant to their development. Please refer to our [website](#) for further details.

If you have any queries on the above, please do not hesitate to contact us.

Yours faithfully

Ruth Prichard

Cynghorydd - Cynllunio Datblygu / Advisor - Development Planning
Cyfoeth Naturiol Cymru / Natural Resources Wales

4.3. *Appendix C – Option 1 Treatment Plant Specification and Phosphate Calculations*



Technical data sheet for one Advanced wastewater treatment plant

Graf UK Ltd

Regen House, Beaumont Road, Banbury
Oxfordshire OX16 1RH
Tel. +44 (0)1608 661500
info@grafuk.co.uk

Plant size

175 PE

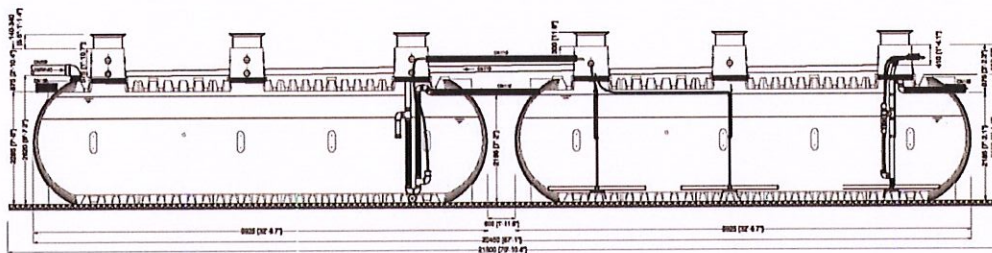
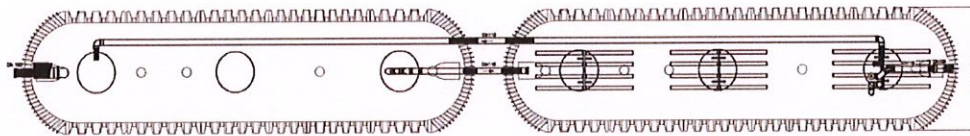
Maximum flow Qd 26,25 m³/d
Maximum organic load Bd 10,50 kg/d

Design according to ATV-A122

Effluent values:

	BOD ₅	COD	SS	NH ₄ N	TN	TP	Coliforms
< target:	20 mg/l		30 mg/l	20 mg/l	15 mg/l	4 mg/l	

Total tank capacity:							74,3 m ³
Air compressor	Type:	Rotary vane					KDT 3.80
	Installed motor power						2,2 kW
	Power consumption at 0,3 bar						2,4 kW
	Motor design				0,5 bar 50 Hz 3~	400 V	
Daily operating time							13,3 h/d



Symbolic representation

Stage	Number	Container, material	Diameter Width [m]	Length [m]	Maximum water depth [m]	Maximum volume [m ³]
SS + PT + B	1	Carat 38000, PE	2,50	10,01	2,20	37,1
SBR	1	Carat 38000, PE	2,50	10,01	2,20	37,1

Hoses	V1: 1x 25mm	V2: 3x 25mm	V3: 1x 25mm	V4: 1x 25mm
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Calculation for one Advanced wastewater treatment plant according to ATV-A122

Basic data / project data

Customer	Graf UK Ltd	Date	12.07.2024
Project	Anglesey, North Wales	Editor	sasc
Type of waste water:	domestic		
Particularities			

Base of calculation

	BOD ₅	COD	SS	NH ₄ N	TN	TP	Coliforms
Outlet	< 400 mg/l		< 467 mg/l	< 43 mg/l		< 8 mg/l	
target	< 20 mg/l		< 30 mg/l	< 20 mg/l			
					< 15,0 mg/l	< 4,0 mg/l	

Population equivalent						175 PE
Wastewater			at Q _{PE}		150 l / (PE*d)	26,3 m ³ /d
Infiltration water					0 %	0,0 m ³ /d
Total daily inflow				Q _d		26,3 m ³ /d
Daily peak factor						10 h/d
Hourly volume of wastewater						2,6 m ³ /h
Waste load BOD ₅				B _d	60 g/(PE x d)	10,50 kg/d
Waste load COD					120 g/(PE x d)	21,00 kg/d
Waste load SS					70 g/(PE x d)	12,25 kg/d
Waste load NH ₄ N					6,5 g/(PE x d)	1,14 kg/d
Waste load TKN					11 g/(PE x d)	1,93 kg/d
Waste load TP		(Normal: 12 g/(PE x d))			1,2 g/(PE x d)	0,21 kg/d
After primary treatment						
Waste load BOD ₅				B _d	40 g/(PE x d)	7,00 kg/d
Waste load COD					80 g/(PE x d)	14,00 kg/d
Waste load SS					25 g/(PE x d)	4,38 kg/d
Waste load NH ₄ N					2,3 g/(PE x d)	0,41 kg/d
Waste load TKN					10 g/(PE x d)	1,75 kg/d
Waste load TP					1,1 g/(PE x d)	0,19 kg/d
Supposed water temperature						12 °C
Treatment cycles per day						4

1. Stage: sludge storage, pre-treatment and buffer

Container type		Carat 38000
Number of containers / proportion of chambers		1
Width		2,50 m
Length		10,01 m
Water depth		2,20 m
Partition height		2,30 m
Total area		25,03 m ²
Sludge storage (SS)		
Specific sludge storage volume		250 l / (PE*a)
Removal interval		6,0 months
Required volume	175 PE x 250 l / (PE*a) x 6 / 12 months =	21,88 m ³
Required water depth		1,35 m
Primary treatment (PT)		
Retention period	(37,14 m ³ - 21,88 m ³ - 8,81 m ³) / 2,6 m ³ /h =	2,46 h
Required volume		3,94 m ³
Required water depth		0,18 m
Overall (SS + PT)		
Required water depth	1,35 m + 0,18 m =	1,53 m
Selected water depth		1,66 m
Buffer (B)		
Percentage of daily load		33%
Required volume	33% x 26,25 m ³ /d =	8,75 m ³
Required water depth		0,54 m
Selected water depth		0,54 m
Selected volume	34% Total daily inflow =	8,81 m ³
Overall (SS + PT + B)		
Required volume	21,9 m ³ + 3,9 m ³ + 8,8 m ³ =	34,56 m ³
Existing total volume		37,14 m ³
Required water depth (SS + PT + B)	1,35 m + 0,18 m + 0,54 m =	2,08 m

Calculation for one Advanced wastewater treatment plant according to ATV-A122

Basic data / project data

Customer	Graf UK Ltd	Date	12.07.2024
Project	Anglesey, North Wales	Editor	sasc
Type of waste water:	domestic		
Particularities			

2. Stage: biological treatment (SBR)

Container type		Carat 38000
Number of containers / proportion of chambers		1
Width		2,50 m
Length		10,01 m
Water depth	Wd max =	2,20 m
Total area		25,03 m ²
Required volume	7 kg/d / 0,2 kg/(d*m ³) =	35,00 m ³
Required water depth		2,03 m
Volume load BOD ₅	Br	7 kg/d / 37,14 m ³ =
BOD Sludge loading	B _{TS}	≤
Sludge index	ISV	100,00 ml/g
Mixed Liquor Suspended Solids	TS _{BB}	≤
Oxygen concentration	C _o	≥
Selected water depth Before loading phase	Wd max - 33% x 26,25 m ³ /d =	1,66 m
Water depth After loading phase	Wd min + 25% x 26,25 m ³ /d =	2,03 m
Existing total volume		37,14 m ³



Technical data sheet for oneAdvanced wastewater treatment plant

Graf UK Ltd

Regen House, Beaumont Road, Banbury
Oxfordshire OX16 1RH
Tel. +44 (0)1608 661500
info@grafuk.co.uk

Plant size

175 PE

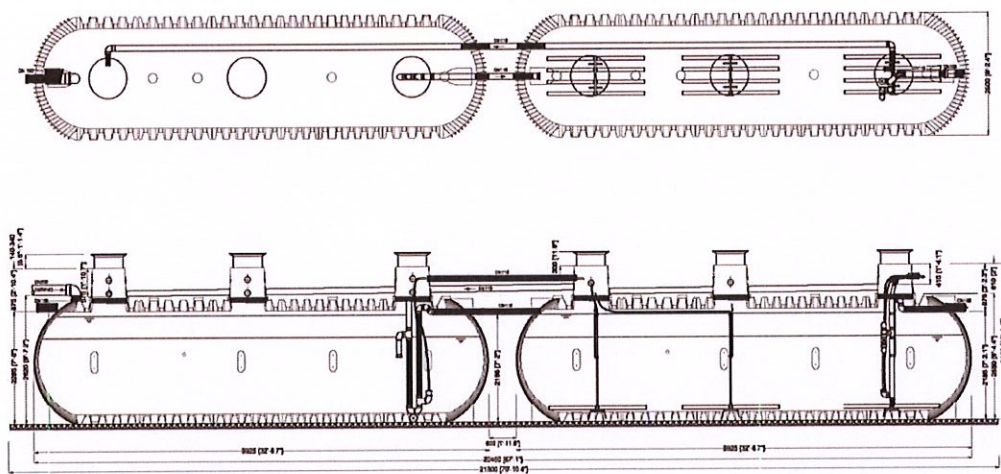
Maximum flow	Qd	26,25 m ³ /d
Maximum organic load	Bd	10,50 kg/d

Design according to ATV-A122

Effluent values:

	BOD ₅	COD	SS	NH ₄ N	TN	TP	Coliforms
< target:	20 mg/l		30 mg/l	20 mg/l	10 mg/l	2 mg/l	

Total tank capacity:							74,3 m ³
Air compressor	Type:	Rotary vane					KDT 3.80
	Installed motor power						2,2 kW
	Power consumption at 0,3 bar						2,4 kW
	Motor design		0,5 bar	50 Hz	3~	400 V	
Daily operating time							13,3 h/d



Symbolic representation

Stage	Number	Container, material	Diameter Width [m]	Length [m]	Maximum water depth [m]	Maximum volume [m ³]
SS + PT + B	1	Carat 38000, PE	2,50	10,01	2,20	37,1
SBR	1	Carat 38000, PE	2,50	10,01	2,20	37,1

Hoses	V1: 1x 25mm	V2: 3x 25mm	V3: 1x 25mm	V4: 1x 25mm
-------	-------------	-------------	-------------	-------------

Calculation for one Advanced wastewater treatment plant according to ATV-A122

Basic data / project data

Customer	Graf UK Ltd	Date	12.07.2024
Project	Anglesey, North Wales	Editor	sasc
Type of waste water:	domestic		
Particularities			

Base of calculation

	BOD ₅	COD	SS	NH ₄ N	TN	TP	Coliforms
	< 400 mg/l		< 467 mg/l	< 43 mg/l		< 8 mg/l	
Outlet target	< 20 mg/l		< 30 mg/l	< 20 mg/l			
					< 10,0 mg/l	< 2,0 mg/l	

Population equivalent						175 PE		
Wastewater			at Q _{PE}		150 l / (PE*d)	26,3 m ³ /d		
Infiltration water					0 %	0,0 m ³ /d		
Total daily inflow				Q _d		26,3 m ³ /d		
Daily peak factor						10 h/d		
Hourly volume of wastewater						2,6 m ³ /h		
Waste load BOD ₅				B _d	60 g/(PE x d)	10,50 kg/d		
Waste load COD					120 g/(PE x d)	21,00 kg/d		
Waste load SS					70 g/(PE x d)	12,25 kg/d		
Waste load NH ₄ N					6,5 g/(PE x d)	1,14 kg/d		
Waste load TKN					11 g/(PE x d)	1,93 kg/d		
Waste load TP		(Normal: 12 g/(PE x d))			1,2 g/(PE x d)	0,21 kg/d		
After primary treatment								
Waste load BOD ₅				B _d	40 g/(PE x d)	7,00 kg/d		
Waste load COD					80 g/(PE x d)	14,00 kg/d		
Waste load SS					25 g/(PE x d)	4,38 kg/d		
Waste load NH ₄ N					2,3 g/(PE x d)	0,41 kg/d		
Waste load TKN					10 g/(PE x d)	1,75 kg/d		
Waste load TP					1,1 g/(PE x d)	0,19 kg/d		
Supposed water temperature						12 °C		
Treatment cycles per day						4		

1. Stage: sludge storage, pre-treatment and buffer

Container type		Carat 38000
Number of containers / proportion of chambers		1
Width		2,50 m
Length		10,01 m
Water depth		2,20 m
Partition height		2,30 m
Total area		25,03 m ²
Sludge storage (SS)		
Specific sludge storage volume		250 l / (PE*a)
Removal interval		6,0 months
Required volume	175 PE x 250 l / (PE*a) x 6 / 12 months =	21,88 m ³
Required water depth		1,35 m
Primary treatment (PT)		
Retention period	(37,14 m ³ - 21,88 m ³ - 8,81 m ³) / 2,6 m ³ /h =	2,46 h
Required volume		3,94 m ³
Required water depth		0,18 m
Overall (SS + PT)		
Required water depth	1,35 m + 0,18 m =	1,53 m
Selected water depth		1,66 m
Buffer (B)		
Percentage of daily load		33%
Required volume	33% x 26,25 m ³ /d =	8,75 m ³
Required water depth		0,54 m
Selected water depth		0,54 m
Selected volume	34% Total daily inflow =	8,81 m ³
Overall (SS + PT + B)		
Required volume	21,9 m ³ + 3,9 m ³ + 8,8 m ³ =	34,56 m ³
Existing total volume		37,14 m ³
Required water depth (SS + PT + B)	1,35 m + 0,18 m + 0,54 m =	2,08 m

Calculation for one Advanced wastewater treatment plant according to ATV-A122

Basic data / project data

Customer	Graf UK Ltd	Date	12.07.2024
Project	Anglesey, North Wales	Editor	sasc
Type of waste water:	domestic		
Particularities			

2. Stage: biological treatment (SBR)

Container type	Carat 38000
Number of containers / proportion of chambers	1
Width	2,50 m
Length	10,01 m
Water depth	Wd max = 2,20 m
Total area	25,03 m ²

Carbon dosing

desired ratio		BOD ₅ : TN : TP = 100 : 19 : 3	
existing ratio		BOD ₅ : TN : TP = 100 : 25 : 2,7	
strived for TKN		1,75 kg/d / 19 =	9,21 kg/d BOD ₅
additionally required TKN		9,21 kg/d - 7 kg/d =	2,21 kg/d BOD ₅
Carbon carrier used:	Brenntapplus	Active substance:	1,00 kg/l BOD ₅
requirement		2,21 kg/d / 1 kg/l =	2,21 l/d =
Required volume		9,21 kg/d / 0,2 kg/(d·m ³) =	46,05 m ³
Required water depth			2,50 m
Volume load BOD ₅	Br	9,21 kg/d / 37,14 m ³ =	0,25 kg / (m ³ x d)
BOD Sludge loading	B _{TS}	≤	0,05 kg/(kg x d)
Sludge index	ISV		100,00 ml/g
Mixed Liquor Suspended Solids	TS _{BB}	≤	4,00 kg/m ³
Oxygen concentration	C _o	≥	2,00 mg/l
Selected water depth Before loading phase		Wd max - 33% x 26,25 m ³ /d =	1,66 m
Water depth After loading phase		Wd min + 25% x 26,25 m ³ /d =	2,03 m
Existing total volume			37,14 m ³

GRAF Professional

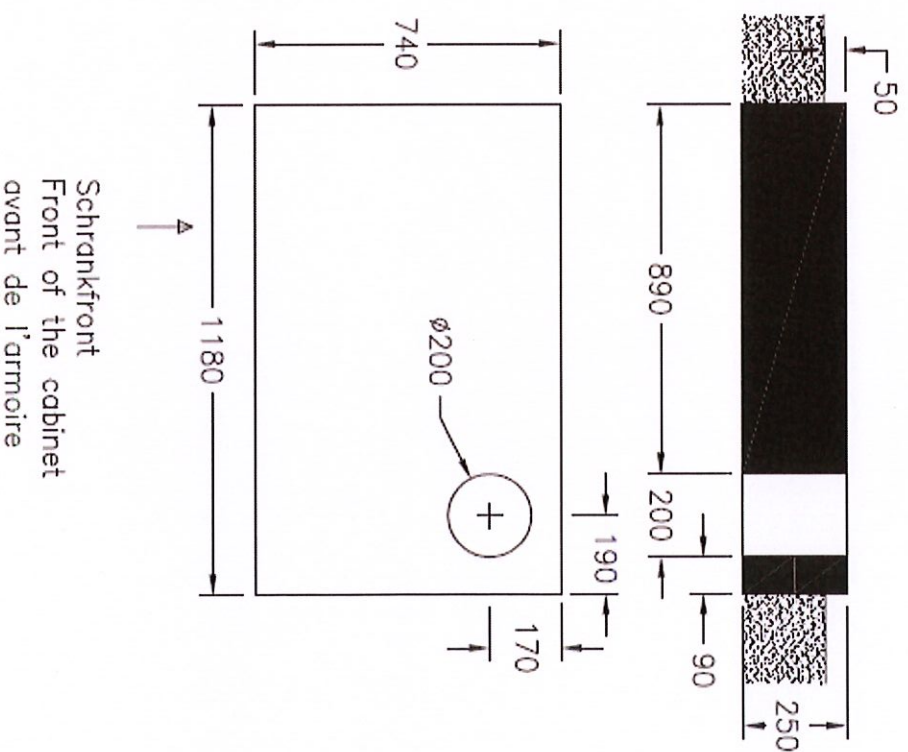
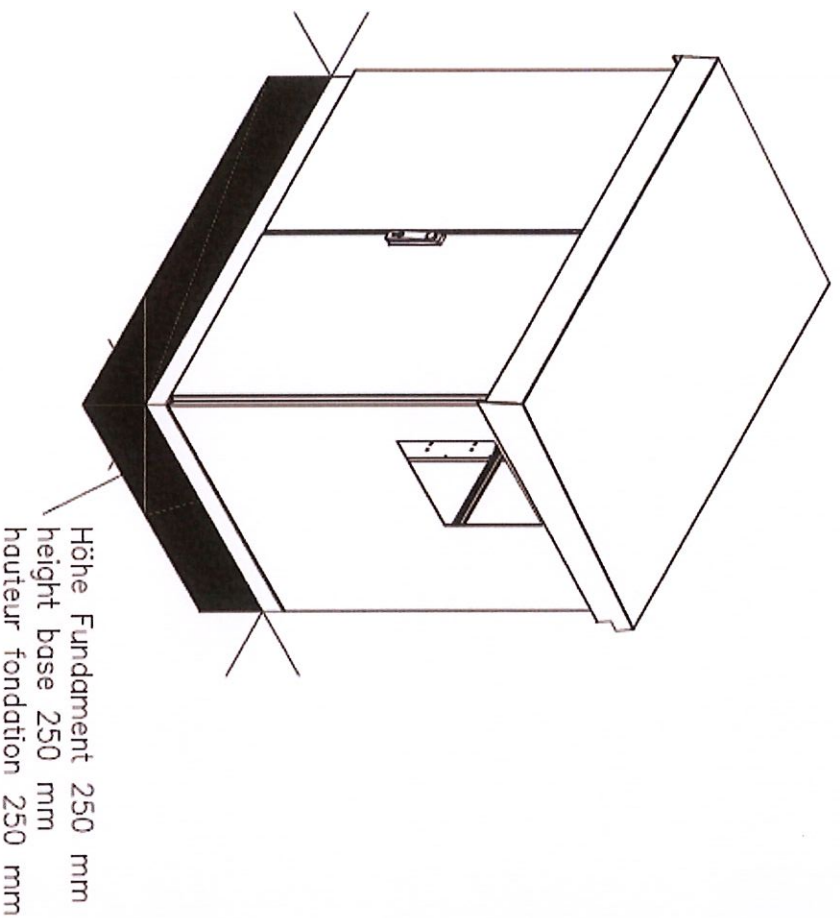
System components – External cabinets with control unit

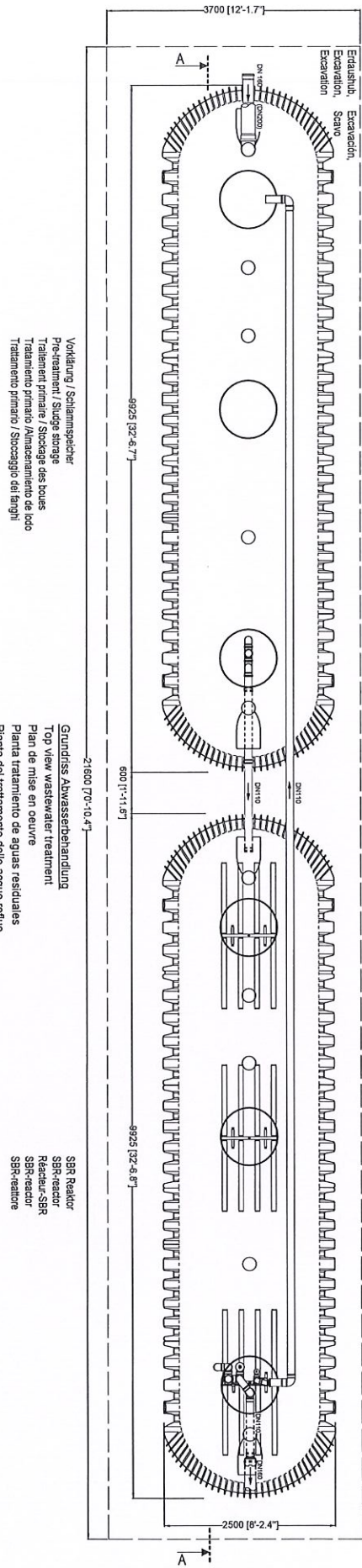


External steel cabinet XL suitable for compressor DT4.25; DTN41; KDT3.60; KDT 3.80	
Material	Steel plate 1,5 mm, powder-coated
Lock	pivot lever inc. cylinder lock
Dimensions [WxHxD]	1200 x 1110 x 800 mm
Weight, net	140 kg
Space for 30 L precipitant canister	

GRAF Professional

System components – Plinth Dims. for External Cabinet XL

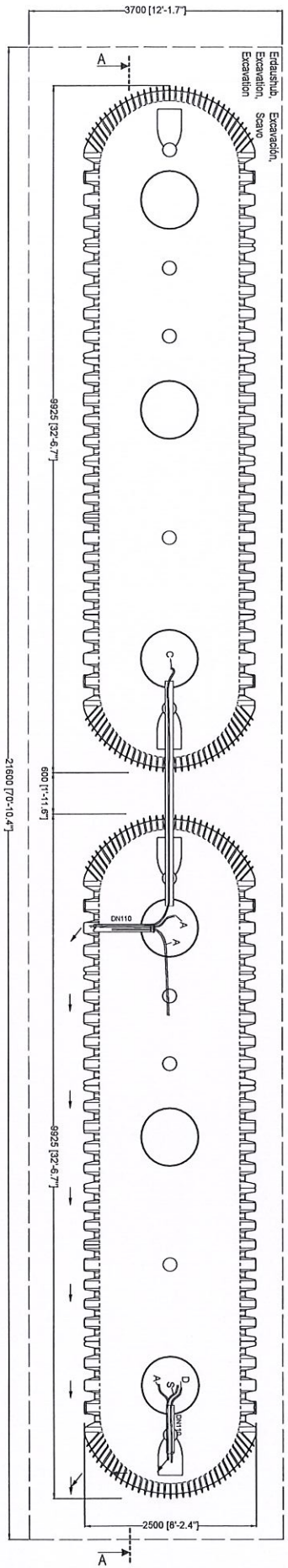




Vorklärung / Schlamm-speicher
 Pre-treatment / Sludge storage
 Traitement primaire / Stockage des boues
 Tratamiento primario / Almacenamiento de lodo
 Trattamento primario / Stockaggio del fanghi

Grundriss Abwasserbehandlung
 Top view wastewater treatment
 Plan de mise en oeuvre
 Planta tratamiento de aguas residuales
 Pianta del trattamento delle acque reflue

SBR Reaktor
 SBR-reactor
 Réacteur-SBR
 SBR-reactor
 SBR-reactore



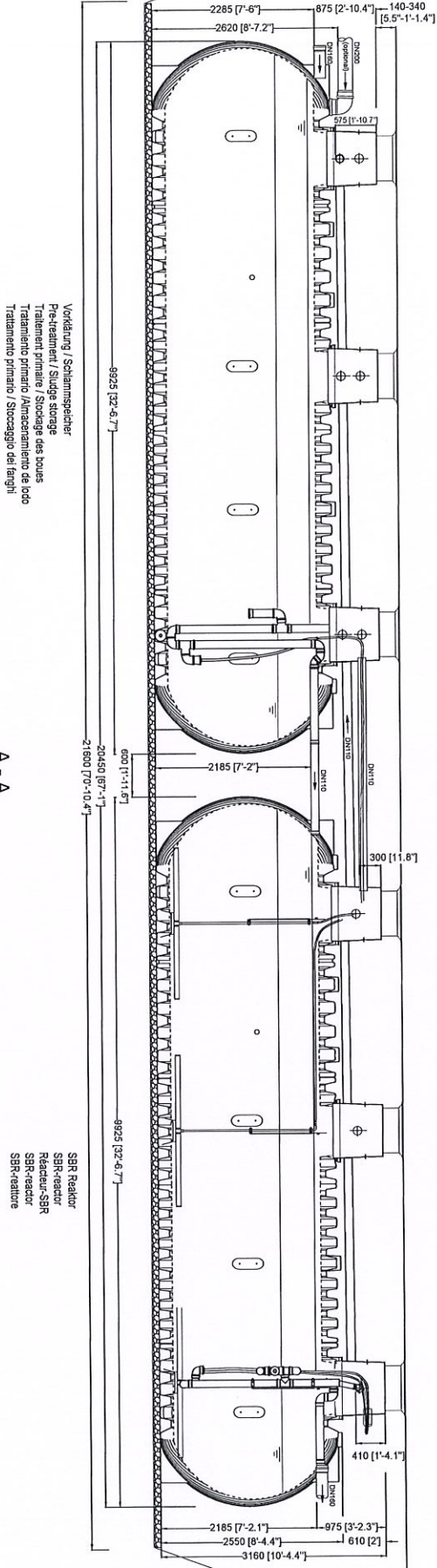
Grundriss Luftschläuche
 Top view compressed air
 Plan de raccordement des tuyaux d'air
 Vista superior tubería aire comprimido
 Pianta dei tubi di aria compressa

Luftschläuche, Compressed air, Tuyaux de pression, Mangueras de presión, Tubi di aria compressa

A Belüftung Aeration Aération Ventilación Ventilazione	25mm Ø (blau) 25mm Ø (bleu) 25mm Ø (bleu) 25mm Ø (azul) 25mm Ø (blu)	D Klarwasserabzug Discharging lifter Évacuation des eaux traitées Drenaje de agua clara Scarico di acqua chiara	25mm Ø (schwarz) 25mm Ø (black) 25mm Ø (noir) 25mm Ø (negro) 25mm Ø (nero)
C Beschickungsheber Charging lifter Transfert Alimentación Alimentazione	25mm Ø (rot) 25mm Ø (rouge) 25mm Ø (rojo) 25mm Ø (rosso)	S Schlammrückführung Sludge return Recirculation des boues Recirculación lodos Ricircolo dei fanghi	25mm Ø (weiß) 25mm Ø (white) 25mm Ø (blanc) 25mm Ø (blanco) 25mm Ø (bianco)

D		oneAdvanced 175 EW Tankdom Maxi 2 x Carat XXL 38000 L / 2 x 10038 gal.		Artikel- no. article no.	105220
GB	oneAdvanced drawn	ES	oneAdvanced 175 PE Copula Maxi, 2 x Carat XXL 38000 L / 2 x 10038 gal.	revision	1 / 2
gezeichnet drawn	ISC	Gewicht weight			
Datum date	2022.11.15	Toleranz tolerance	+/- 3%		
Maßstab scale	M 1:50	Einheiten units	mm [inch] gal. = US gal.		
		FR	oneAdvanced 175 EH Maxi-dôme, 2 x Carat XXL 38000 L / 2 x 10038 gal.		
		Oto Graf GmbH Carl-Zeiss-Str. 2-6 DE-79331 Temingen mail@graf.info www.graf.info			





Vorklärung / Schlammespeicher
 Pre-treatment / Sludge storage
 Traitement primaire / Stockage des boues
 Trattamento primario / Accumenamento de lodo
 Trattamento primario / Stoccaggio dei fanghi

A - A

SBR Reaktor
 SBR-reactor
 Réacteur-SBR
 SBR-reactor
 SBR-reatore

D oneAdvanced 175 EW Tankdom Maxi 2 x Carat XXL 38000 L / 2 x 10038 gal.		Artikel-Nr. product no. article no. revision	105220 2 / 2		
GB oneAdvanced 175 inh. TD-Maxi 2 x Carat XXL 38000 L / 2 x 10038 gal.	ES oneAdvanced 175 PE Cubula Maxi 2 x Carat XXL 38000 L / 2 x 10038 gal.	FR oneAdvanced 175 EH Maxi-dome 2 x Carat XXL 38000 L / 2 x 10038 gal.	Zeichnung drawing Datum date Maßstab scale	Gewicht weight Toleranz tolerance Einheiten units	Carl-Zeiss-Sir. 2,6 DE-79331 Teningen mail@grat.info www.grat.info
Zeichnung drawing Datum date Maßstab scale	Zeichnung drawing Datum date Maßstab scale	Zeichnung drawing Datum date Maßstab scale	Zeichnung drawing Datum date Maßstab scale	Gewicht weight Toleranz tolerance Einheiten units	Carl-Zeiss-Sir. 2,6 DE-79331 Teningen mail@grat.info www.grat.info



4.4. *Appendix D – Site Plan showing Treatment Plant and Soakaway Location*



- GAS - Yellow
- WATER - Blue
- ELECTRICITY - Red
- COMMUNICATIONS - Green
- STREET LIGHTING - Orange
- SURFACE WATER DRAINAGE - Blue
- POUL DRAINAGE - Brown

27/03/2022
28/03/2022
29/03/2022
30/03/2022
31/03/2022
01/04/2022

imp | architects
The Old Bakery, 77 Chesham Street, Llanelli, SA11 1BB
Blaenclydach, Carmarthen, SA31 3JG
01792 523222
01792 523223
01792 523224
01792 523225
01792 523226

Project Name: **8139**
Proposed Site: **8139**
Date: **01/11/2022**
Scale: **1:500**
Drawing Number: **8139-01**
Category: **Building Plans**

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4.5. *Appendix E – Treatment Plant Cost Breakdown*

Appendix E - Treatment Plant Cost Breakdown

Ref	Description	Qty	Unit	Rate	Total
1.0	Treatment Plant				
	Klaro XXL 175 PE Advanced Treatment Plant System including 2x 38,000L Carat XXL, External Sampling Chamber and Control System, for installation in plant room, or similar.				
1.1		1	item	£ 38,946.00	£ 38,946.00
1.2	Carbon Dosing +C Package	1	item	£ 1,200.00	£ 1,200.00
1.3	Dentrification +D Module	1	item	£ 800.00	£ 800.00
1.4	Saphir Tank	1	item	£ 592.40	£ 592.40
2.0	Installation by Britannia Projects Limited				
	Excavation for treatment plant and removal of excavated material to off-site landfill - 21.6m x 3.5m x 3.7m, concrete base, back fill and pipe bedding, drop treatment plant				
2.1		1	LUMPSUM		£ 5,800.00
	Excavate and lay 100mm ø french drains / soakaway pipes at 450mm cover to fields encased in 40mm clean drain stone				
2.3		170	m	£ 20.00	£ 3,400.00
2.4	Electric supply to treatment plant	1	LUMPSUM		£ 1,200.00
2.5	Back fill and reinstate	1	LUMPSUM		£ 2,000.00
	TOTAL				£ 53,938.40



QUOTATION

Quote Number: 00041144
17 July 2024


Amy Brooke
Britannia Projects Ltd

Tel:
Email: amy@britanniaprojects.co.uk

Dear Amy,

Re: Casita - Foul Sewage Connection / Treatment Plant

Further to receipt of your recent enquiry for the above project, we are pleased to provide the following proposal for your consideration. We hope this is of interest to you and look forward to discussing this with you soon. Please let us know if you require any further information.

Product	Product Description	Product code:	Qty	Item Price:	Sub-Total:
Klaro XXL 175 PE Advanced Treatment Plant System	Klaro XXL 175PE Advanced Treatment Plant System System comprises: 2x 38,000L Carat XXL External sampling chamber Control system for installation in plant room, or similar		1	£38,946.94	£38,946.94
Carbon Dosing +C Package - Graf Advanced Systems 60-1000PE	Carbon Dosing +C Package - Graf Advanced Systems 60-1000PE 107348 - Dosing Pump 934686 Toe filter 107362 Fixing Plate 107656- 30Kg drum of Brenntapplus Carbon Solution		1	£1,200.00	£1,200.00
+D Denitrification Module	The +D module for denitrification (removal of nitrogen) results in the improved water quality which can help satisfying very strict requirements.	+D Module	1	£800.00	£800.00
External Cabinet XXL	External Cabinet XL - 175-1000PE Required as an extra over item if a plant room or similar is not available to house the internal controls & compressors		1	£3,500.00	£3,500.00
Saphir tank	SAPHIR universal shaft 1200 litres, without cover Telescopic dome shaft with cast iron lid, suitable for vehicle loading	G50086 	1	£592.40	£592.40

Sub-Total:	£45,039.34
Discount:	0%
Total Price:	£45,039.34
VAT Amount:	£9,007.87
Grand Total:	£54,047.21

Notes;

Connecting Pipework & Fittings

For the supply of multi-tank systems, all connecting pipework & fittings between tanks would need to be supplied by others, unless specifically agreed in writing with Graf UK. This would also apply for connecting from the main storage tank to any controls, such as control panels & compressor.

Storage

Where non-stock items are being supplied, Graf UK will store materials for a maximum of 2 weeks after the agreed delivery date. After this time, Graf UK reserve the right to invoice for the materials and charge storage costs per week, rates subject to storage space required.

RATES EXCLUDE VAT AND INCLUDE DELIVERY. OFFLOAD TO BE PROVIDED BY CUSTOMER.

Deliveries will be made on curtain-sided lorries as standard.

Any special delivery requirements i.e. FORS, RIGID vehicles or crane-offload, will be subject to additional charges and must be confirmed before an order is placed so our quotation can be amended accordingly.

Quotation is valid for 20 days and is subject to Graf UK Limited's conditions of sale E & O. E

Thank you for the opportunity to provide this quotation. We hope this is of interest to you, if you do require any further information then please contact Michael Connolly 07718484019 or email: mconnolly@grafuk.co.uk

Best regards,

Michael Connolly
Business Development Manager

4.6. *Appendix F – Welsh Water Representative email confirming Option 2 as unsuitable*



Dominic Brooke

to Sion, me ▾

Hi Sion

Thank you for your reply. While we acknowledge Welsh Water's position, we are presently weighing up the viability and costs of connection to the main sewer system.

As the plan sent on Thursday and the proposed connection to Welsh water foul manhole 0701 (or "C" marked on the drawing we produced), Can we agree that, subject to the required SPS assessment and the results of that being suitable for a connection to the main sewer. That this position would be the most likely for our connection?

Once we have this primary agreement, we can seek Q.S advice as to probable cost of this connection and associated works which could be assessed for its feasibility and what would be deemed reasonable in cost and environmental impact.

Welsh Water's comments would be of great help in these calculations.

Regards Dominic Brooke

Tue, 9 Jul, 12:03 (9 days ago)





Sion Jones
to Dominic, me ▾

9 Jul 2024, 13:23 (9 days ago)



Hi Dominic,

I can confirm it would be unsuitable to connect onto a 100mm sewer. Accordingly, if connection point C is your preferred strategy, I would advise that a connection would only be acceptable subject to the hydraulic modelling assessment and any necessary reinforcement works as identified within this assessment being undertaken. I trust you'll find this e-mail in order.

Regards,

Siôn



Siôn Jones

Lead Development Planning Officer | Developer Services

Dŵr Cymru Welsh Water



W: dwrcymru.com



E: developer.services@dwrcymru.com



T: 0800 917 2652 | M: 07770856624



A: PO Box 3146, Cardiff, CF30 0EH



Before you print please think about the **ENVIRONMENT**

4.7. *Appendix G – Option 3 Public Sewer Connection Cost Breakdown*

Casita - Foul Connection Public Sewer Costs

Ref	Description	Qty	Unit	Rate	Total
Packaged Pump Station and Rising Main					
1.0	Excavation and disposal of suitable material Installation of Type 2 sewage pumping station and kiosk - valve chamber 4m deep and reinstate Including fencing,gates , permeable area ,inlet manhole	1	SUM	£88,000.00	£ 88,000.00
2.0	95mm ø pumping main (900mm cover) in field. Excavation, pipe bedding & surround, back fill and reinstate.	29	m	£85.00	£ 2,465.00
3.0	95mm ø pumping main in private tarmac drive (900mm cover). Excavation, removal of surplus material, backfill with pipe bedding, type 1 subbase and tarmac reinstatement.	118	m	£240.00	£ 28,320.00
4.0	95mm ø pumping main in council highway (900mm cover). Excavation, removal of surplus material, backfill pipe bedding, type 1 subbase and tarmac reinstatement.	38	m	£280.00	£ 10,640.00
5.0	1200 ø manhole chamber with baffle plate	1	nr	£5,500.00	£ 5,500.00
Gravity Sewer in Highway					
6.0	150 ø VC gravity sewer in council highway (900mm cover). Reinstae with type 1 subbase, 10mm pipe bedding, reinstae tarmac.	229	m	£295.00	£ 67,555.00
7.0	1200 ø manholes, 1050mm deep to invert, benching, step irons, heavy duty cover and frame, concrete surround Depth n.e 1.5m	7	nr	£5,000.00	£ 35,000.00
8.0	150 ø VC sewer in A545 highway. Reinstae type 1 subbase, 10mm pipe bedding, reinstae tarmac. Depth ne 1.5m	102	m	£375.00	£ 38,250.00
Further Developers Costs					
9.0	Traffic Management	1	SUM	£6,000.00	£ 6,000.00
10.0	Road Closure	1	SUM	£2,500.00	£ 2,500.00
11.0	Preliminaries	1	SUM	£20,000.00	£ 20,000.00
12.0	Service Crossings	40	nr	£400.00	£ 16,000.00
13.0	Disposal of excavated rock	30	m3	£60.00	£ 1,800.00
14.0	Welsh Water fees and adoption	1	SUM	£5,000.00	£ 5,000.00
15.0	Electric Supply to Pump Station	1	item	£3,000.00	£ 3,000.00
Sub Total					£ 330,030.00
Contingency @ 10%					£ 49,504.50
TOTAL					£ 379,534.50

TOTAL	£	379,534.50
VAT@20%	£	75,906.90
TOTAL	£	455,441.40



Dominic Brook

Quotation no. Q19836

24th July 2024

Dear Dominic,

Re: Casita Foul Connection Public Sewer Costs.

Thank you for your enquiry in respect of the above work. We are pleased to provide the following quotation for the completion of that work.

Our contract engineers believe they have given a considered value for money response to your enquiry, but should you have any suggestions or ideas as to how we can carry out the work more economically, we would be more than happy to discuss them with you.

Yours sincerely,

For and on behalf of
JBF group

Gwyn Jones

Civils Manager

Mobile: 07775 670994

Email: gwyn@jbfgroup.co.uk



Scope of Work

The supply of all Labour, plant and materials to undertake the following works in accordance with the enquiry documentation. recent meetings. emails.

- We have made suitable allowances for the following whilst undertaking the works
 - Completion of all works in accordance with CDM 2015, STS policies and HSEQ policies
 - Provision of a Clause 31 program with monthly updates
 - Supervision of works.
 - All plant and equipment
 - All fuel including refueling facilities

Scope of works

- Construct, packaged Pumping station
- Installation of pumping main in fields and highway.
- Gravity sewer in Highway.
- Traffic management
- Reinstatement
 - Testing of pipework

Total sum of above £379,534.50

Note: VAT will be charge on the above prices at the current rate.

Exclusions

- Permanent Fencing.
- Over pumping of existing sewerage to make connections
- Flow meter and Chamber
- Any other works not explicitly detailed above
- Site security
- Disposal off site of any non-inert material (rates provided allow for inert material acceptable at local transfer station and exclude and hazardous disposal / landfill taxes)
- Diversion of any services not explicitly detailed

Program

To be agreed



Assumptions

- Any variations in the scope of work would be charged at our standard day work rates and would be invoiced monthly.
- Welfare facilities provided by the client
- No weekend working allowed for.
- We will have uninterrupted work with no access issues.
- Electrical supply for pumps to be provided by client within 25m of pumping station

Terms

To be agreed

