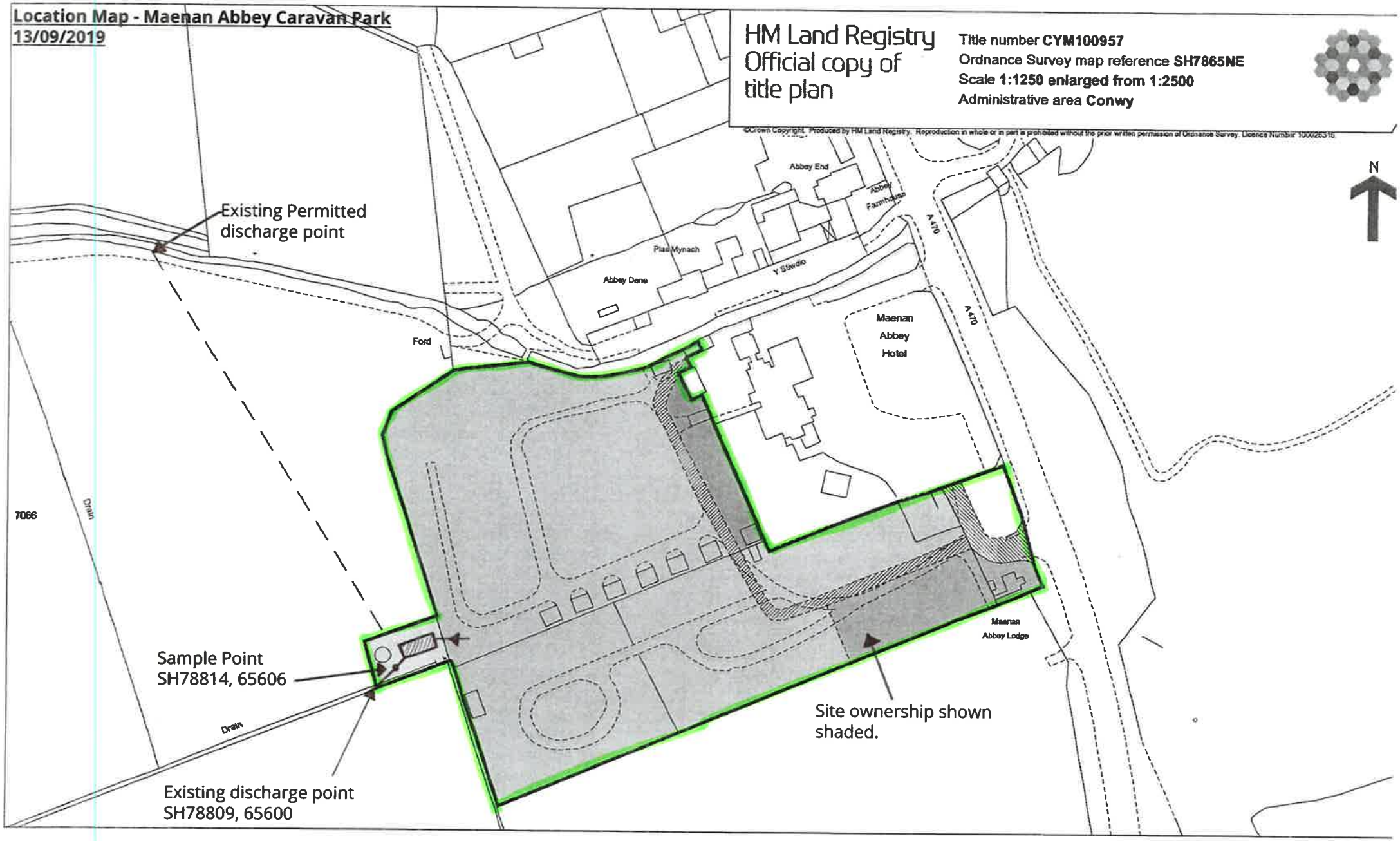

C2 5.Environmental Risk Assessment

Hazard	Receptor	Pathway	Risk Management	Probability	Consequence	Overall Risk
Excessive smell from treatment plant	Affects use of public amenities adjacent to the site	Breeze/wind has potential to drive smell to adjacent park/amenities	Correct functioning of treatment system maintains aerobic digestion and avoids odour	Unlikely	Nuisance. No health risk.	Not significant as long as management procedures adhered to.
Excessive noise from treatment plant	Affects use of public amenities adjacent to the site	Breeze/wind has potential to drive noise to adjacent park/amenities	Plant is specified within Environment Health guidelines	Unlikely	Nuisance. No health risk.	Not significant.
Treatment system failure (eg. Lack of maintenance)	Local watercourse	Drainage system	Correct monitoring of treatment system will identify failures. Service contract with approved contractor to ensure timely repair.	Possible	Pollution of field.	Low risk so long as management procedures are adhered to and service contract maintained.
Containment failure due to blockage in drainage system	Private Land	Overground	Correct maintenance. Signage in all property kitchens. Desludging of settlement tank	Unlikely	Surcharging of all or part of treatment system with possible spillage of untreated effluent onto Private Land.	Not significant as long as management procedures adhered to.

Summary

The primary risk associated with the system is pollution of the local area. This risk is minor so long as management procedures are adhered to. Other risks are no judged to be significant so long as the system is correctly designed and installed and management procedures are correctly adhered to.

CG00702-01

DCRJ/JW

ER/AL C.203/8 & CW/42/3 21st March, 1967.

Dear Sir,

Rivers (Prevention of Pollution) Acts 1951 to 1961
Maenan Abbey Caravan Park Sewage Disposal

With reference to your application of 14th February 1967, the Gwynedd River Authority, in pursuance of their powers under the above Acts, hereby consent to the bringing into use of a new outlet for the discharge of sewage effluent and the making of a new discharge of sewage effluent into the Abbey stream at a point on its left bank some 200 yards downstream of the main Abbey building and some 170 yards upstream of the railway culvert in accordance with the plans numbered 808/W/3 and 808/W/4 and subject to the following conditions:-

1. The volume of the discharge in any period of 24 hours shall not exceed 3,850 gallons. 3850 = 17502.45 l
   17.500 l

2. The discharge shall at no time:-

   (a) contain more than 30 parts per million of suspended matter dried at 105° C. 30 TSS

   (b) take up more than 20 parts per million of dissolved oxygen in 5 days at 20° C. 20 DO.

3. Sampling facilities shall be provided so as to enable the Authority's sampling officers to sample the effluent discharged prior to its admixture with the river water.

The terms of this consent will not, without the consent in writing of the person to whom this consent is given (or his successor), be altered before the expiration of the period ending with the 1st day of April 1969.

Yours faithfully,

F.P. Abbey, Esq.,
Maenan Abbey Caravan Park,
[illegible]
Denbighshire.

Clerk of the Authority

Copy sent to D.C.M. James, Esq., B.Sc., A.M.I.C.E., A.M.I.Struct, E.,
6, Wood Street, Swindon, Wilts.

GWYBODAETH BWYSIG
DARLLENWCH YN OFALUS

NEWIDIADAU CYFREITHIOL SY'N EFFEITHIO AR BAWB SYDD Â CHANITÂD AC UNRHYW BERSON SY'N DIBYNNU AR GANIATÂD I OLLWNG UNRHYW ELIFIANT

Cyfeirnod: Deddf yr Amgylchedd 1995, Atodiad 23, Paragraff 21(2)(b)(ii)

1. ***Beth yw Asiantaeth yr Amgylchedd?***
   Asiantaeth yr Amhgylchedd yw'r asiantaeth fwyaf yn Ewrop i warchod yr amgylchedd ac mae'n gyfrifol am Gymru a Lloegr. Sefydlwyd yr Asiantaeth gan Ddeddf yr Amgylchedd 1995 ('y Ddeddf') ac er 1 Ebrill 1996, ymhlith ei llu dyletswyddau a'i phwerau, mae wedi etifeddu holl bwerau rheoli llygredd yr hen Awdurdod Afonydd Cenedlaethol (AAC).

2. ***Pa wybodaeth bwysig am ganiatâd i ollwng sydd angen i mi fod yn ymwybodol ohoni?***
   Mae'r Ddeddf wedi cyflwyno newid pwysig yn statws cyfreithiol caniatadau gollwng. O 1 Ebrill 1996, bydd caniatâd a roddwyd gan Asiantaeth yr Amgylchedd nawr yn gysylltiedig â'r person (deiliad y caniatâd/y gollyngwr) sy'n gollwng yr elifiant nid, fel gynt, â'r gollwng ei hun (h.y. unrhyw berson sy'n gollwng yr elifiant ac sy'n dibynnu ar y caniatâd).

3. ***Sut mae hyn i gyd yn effeithio arna' i fel deiliad caniatâd yr AAC (neu ei ragflaenydd)?***
   Am gyfnod dros dro o 1 Ebrill 1996 tan 1 Hydref 1996, bydd eich caniatâd yn dal yn ddilys *(Cyf: At 23, para 21(2)(b)(i) o'r Ddeddf)*. Ond wedi'r dyddiad hwnnw dim ond y bobl hynny sy'n gollwng elifiant ac sydd wedi rhoi hysbysiad ysgrifenedig i'r Asiantaeth eu bod yn bwriadu dibynnu ar y caniatâd fydd yn cadw'r amddiffyniad cyfreithiol rhag cyflawni trosedd llygru a ddarperir gan y caniatâd (os bydd y telerau wedi eu ufuddhau).

4. ***Beth sy'n digwydd os na rof hysbysiad ysgrifenedig i'r Asiantaeth?***
   Ar ôl 1 Hydref 1996, oni fyddwn wedi cael hysbysiad ysgrifenedig gennych, bydd eich caniatâd i ollwng yn dod i ben a gallech fod mewn perygl o gael eich erlyn am drosedd llygru. PEIDIWCH AG OEDI. Mae'r Ddeddf yn dweud fod raid i chi ysgrifennu at yr Asiantaeth os bwriadwch ddibynnu ar y caniatâd ar ôl 1 Hydref 1996 (hyd yn oed os nad chi yw deiliad presennol y caniatâd).

5. ***A oes hysbysiad safonol ar gael i mi ei ddefnyddio?***
   Oes. I'ch helpu, mae'r Asiantaeth wedi paratoi hysbysiad safonol, a dylech ei ddefnyddio i'r diben hwn. Mae wedi ei amgau gyda'r nodyn gwybodaeth hwn.
   Llenwch y hysbysiad sydd wedi ei amgau a'i ddychwelyd aton ni yn y cyfeiriad isod.

6. ***Beth os bydd angen cymorth arnaf i lenwi'r hysbysiad hwn?***
   Mae nodiadau cymorth wedi eu cynnwys ar waelod y hysbysiad safonol. Ond os byddwch yn ansicr, bydd staff yr Asiantaeth yn falch eich helpu. Ysgrifennwch aton ni yn y cyfeiriad isod neu ffoniwch **'Ddesg Gymorth Atodiad 23'** ar 0645 333111 (neu 01222 770088) a chewch siarad â staff sy'n gallu helpu.

7. ***Beth am bobl eraill sy'n gollwng elifiant ac sydd hefyd yn dibynnu ar fy nghaniatâd i?***
   Os gwyddoch am unrhyw un arall sy'n dibynnu ar eich caniatâd chi, rhowch gopi o'r hysbysiad safonol sydd wedi ei amgau iddo/iddi ei lenwi. Os bydd angen, gallwch gael rhagor o gopiau o'r hysbysiad safonol drwy ysgrifennu aton ni yn y cyfeiriad isod.

8. ***Beth os bydd deiliad y caniatâd yn newid ar ôl 1 Ebrill 1996?***
   Os bydd newid yn neiliad y caniatâd ar ôl 1 Ebrill 1996, mae'r ddeddfwriaeth nawr yn ei gwneud yn ofynnol i chi roi gwybod i'r Asiantaeth cyn pen 21 diwrnod ar ôl trosglwyddo i'r deiliad newydd. Mae ffurflen ar gael i'r diben hwnnw hefyd, a gallwch ei chael drwy ysgrifennu aton ni yn y cyfeiriad isod.

Asiantaeth yr Amgylchedd, Parc Busnes Llaneirwg, Llaneirwg, CAERDYDD CF3 0EF.
Atodiad 23 Desg Gymorth Tel: 0645 333111 neu 01222 770088 (Ffacs: 01222 798555)

Water Resources Act 1991
as amended by the Environment Act 1995
Consent to Discharge
Certificate of Holder

ENVIRONMENT AGENCY

Part A

To: THORNLEY LEISURE (MAENAN) LTD.
MANAGING DIRECTOR
MAENAN

NEAR LLANRWST LL26 OUL

The **Environment Agency** ("the Agency") hereby confirm that the above named person is a/the registered holder of consent CG0070201

Nature of Discharge(s); SEWAGE EFF/TREATED EFF/CONTINUOUS
at
MAENAN ABBEY CARAVAN PARK LLANRWST

Note: *This certificate should be kept with the consent document for future reference. If you transfer responsibility for the discharge to somebody else you must pass the consent to them and tell the Agency within 21 days.* **Responsibility for the consent cannot be disclaimed by the holder but the registration of holder may be transferred to a successor.** To do this please complete the form below, then tear it off and return it to the address shown. If you fail to transfer the consent, even though you are no longer on the site, you may still be liable for prosecution for pollution. If you transfer the consent but do not tell us, you will be committing an offence. In case of any queries please contact your local Environment Agency office.

Part B **Please complete in block capitals or type.**

To:

Water Resources Act 1991: Notice of transfer of consent to discharge

Consent:

Name:
Address:

I/We* hereby serve notice on the Agency that I/we* am/are* no longer a/the* Holder of the above consent which will be/was* transferred to:

* delete as appropriate

Name(s) of new holder(s):
Address:

Post Code:

CG0070201_2006_03_07

Date of Transfer to new Holder(s); .....

Signed:..... **Dated:**.....

Name (block capitals): ..... **Position:** .....
(to be completed when signing on behalf of corporate bodies)

Written 1/1/96 8747 Ack ✓

NOTICE TO THE ENVIRONMENT AGENCY*

Environment Act 1995, Schedule 23, para 21(2)(b)(ii) (Y)

**The notes below may help in completing this notice.*

WITH RESPECT TO THE FOLLOWING CONSENT [as given by the National Rivers Authority (or its predecessors)] WHICH WAS IN FORCE ON 31st MARCH 1996,

Name on former NRA Register on 31/3/96 THORNLEY LEISURE (MAENAN) LTD

Consent Number CG0070201 **Date consent was given or last reviewed** 21 March 67

for the making of a discharge/several discharges of Treated Sewage Effluent

at Discharge Site Address Cannet Meirman Abbey Caravan Park

I HEREBY GIVE NOTICE TO THE ENVIRONMENT AGENCY THAT I AM THE PERSON MAKING THE DISCHARGE(S) REFERRED TO ABOVE AND THAT I PROPOSE TO RELY ON this consent / the consents as on the attached signed and dated list** *Delete as appropriate*
AFTER 1st OCTOBER 1996 AND WISH TO BE REGISTERED AS THE CONSENT HOLDER.

Name of Consent Holder ('the Discharger') THORNLEY LEISURE (MAENAN) LTD

<If you are a body corporate please complete with the registered name/address of the body corporate - see note 2 below>

Address MAENAN NR LLANRWST CONWY

Post Code LL26 0UL

SIGNED (DAVID THORNLEY) **DATED** 10/9/96

<job title M.D. *>*

<being the person with the delegated authority to sign of behalf of a body corporate - see note 2 below>

NOTES TO HELP YOU TO COMPLETE THIS NOTICE

1. If you are attaching a list of consents (as prepared by us from the NRA Register as on 31/3/96) then please overwrite the top section of this notice with the words 'Consents as on attached signed and dated list'. You should thoroughly check this list and modify and initial where necessary before signing and dating each page of the list and attaching to this completed notice. You may of course use your own list of consents you propose to rely on provided that the information above is included in full and each page is signed and dated.

2. In addition to an individual, a 'person' in legal terms may refer to a 'body corporate' (e.g. public limited company ('plc'), limited company, local authority etc.). In these cases the body corporate will be registered as the consent holder. The person signing on behalf of the body corporate will be the person who has the power to do so (usually the Company Secretary for a plc or limited company, the Chief Executive for a local authority etc). The legal validity of the signatory is the responsibility of the body corporate. If you are signing with the delegated authority of the body corporate, please indicate your job title.

3. Legal advice may be advisable for some situations (e.g. grant maintained schools outside of local authority control).

4. If you are a partnership or registered charity then up to 4 partners/trustees should individually complete this notice. These partners/trustees will then be registered as joint consent holders.

5. If you share the making of the discharge(s) with another person(s) then you should all complete the notice and be registered as joint consent holders. (e.g. householders individually and severally discharging via a common private sewage treatment works).

6. If in doubt, it may help to consider the 'person' as the person, either individually or severally, who would apply for the consent if an application were in future to be made to the Environment Agency. Under the amended legislation, ONLY the registered consent holder may in future apply to the Agency for a variation of the consent.

NOTE: The responsibility for this notice rests entirely with you and the Agency cannot be held responsible in any way for mistakes made as a result of the notes above (or otherwise) which are given in good faith.

HYSBYSIAD I ASIANTAETH YR AMGYLCHEDD

Deddf yr Amgylchedd 1995, Atodiad 23, para 21(2)(b)(ii)

* Gallai'r nodiadau isod fod o gymorth wrth lenwi'r hysbysiad hwn.

YNGLŶN Â'R CANIATÂD CANLYNOL [fel y rhoddwyd gan yr Awdurdod Afonydd Cenedlaethol (neu ei ragflaenwyr)] A OEDD MEWN GRYM AR 31 MAWRTH 1996

Deiliad Cofrestredig ar Gofrestr flaenorol yr AAC ar 31/3/96 .....

Rhif Caniatâd ..... **Dyddiad rhoi'r caniatâd neu ei adolygu ddiwethaf** .....

i ollwng/gollwng nifer o .....

yng Nghyfeiriad y Safle Gollwng .....

.....

YR WYF DRWY HYN YN HYSBYSU I'R ASIANTAETH YR AMGYLCHEDD MAI FI YW'R SAWL SY'N GOLLWNG YR ELIFIANT A ENWYD UCHOD A'M BOD YN BWRIADU DIBYNNU AR y caniatâd hwn/caniatadau hyn fel y gwelir ar y rhestr(au) cysylltiedig sydd wedi eu llofnodi a'u dyddio Dileu'r yn ôl yr angen AR ÔL 1 HYDREF 1996 A DYMUNAF GAEL FY NGHOFRESTRU FEL DEILIAD Y CANIATÂD.**

Enw Deiliad y Caniatâd ('y Gollyngwr').....

<Os corff corfforaethol ydych chi, rhowch enw neu enw cofrestredig y corff corfforaethol - gweler nodyn 2 isod>

Cyfeiriad .....

..... Cod post .....

LLOFNODWYD..... **DYDDIEDIG** .....

<teitl swydd.....

<sef y person sydd â'r awdurdod dirprwyedig i lofnodi ar ran corff corfforaethol - gweler nodyn 2 isod>

NODIADAU I'CH HELPU I LENWI'R HYSBYSIAD HWN

1. Os ydych yn cysylltu'r rhestr(au) caniatâd (fel y paratowyd gennym o Gofrestr yr AAC ar 31/3/96), yna rhowch ar draws rhan uchaf yr hysbysiad hwn y geiriau 'Caniatadau fel ar y rhestr(au) cysylltiedig sydd wedi eu llofnodi a'u dyddio'. Dylech ddarllen y rhestr(au) yn drwyadl a newid a rhoi llythrennau blaen eich enw lle bydd angen cyn llofnodi a dyddio pob tudalen yn y rhestr(au) a'u cysylltu wrth yr hysbysiad hwn ar ôl ei lenwi. Wrth gwrs, gallwch ddefnyddio'ch rhestr(au) eich hun o ganiatadau y bwriadwch ddibynnu arnynt cyn belled â bod y wybodaeth uchod wedi ei chynnwys yn llawn a phob tudalen wedi ei lofnodi a'i ddyddio.

2. Yn ogystal ag unigolyn, gall 'person' yn gyfreithiol gyfeirio ar 'gorff corfforaethol' (e.e. cwmni cyfyngedig cyhoeddus ('ccc'), cwmni cyfyngedig, awdurdod lleol, etc). Mewn achosion felly, caiff y corff corfforaethol ei gofrestru fel deiliad y caniatâd. Y sawl a fydd yn llofnodi ar ran y corff corfforaethol fydd y sawl sydd â'r hawl i wneud hynny (fel rheol, Ysgrifennydd y Cwmni ar ran ccc neu gwmni cyfyngedig, y Prif Weithredwr ar gyfer awdurdod lleol, ac yn y blaen). Cyfrifoldeb y corff corfforaethol yw dilysrwydd cyfreithiol y sawl sy'n llofnodi. Os byddwch yn llofnodi gydag awdurdod dirprwyedig y corff corfforaethol, dywedwch beth yw teitl eich swydd.

3. Gall fod yn ddoeth cael cyngor cyfreithiol mewn rhai achosion (e.e. ysgolion sy'n cael cymorth grant y tu allan i reolaeth awdurdod lleol).

4. Os partneriaeth neu elusen gofrestredig ydych chi, yna dylai hyd at 4 partner/ymddiriedolwr lenwi'r hysbysiad hwn yn unigol. Wedyn, caiff y partneriad/ymddiriedolwyr hynny eu cofrestru fel deiliaid caniatâd ar y cyd.

5. Os ydych chi'n rhannu'r gollwng gyda pherson arall/phersonau eraill, yna dylech lenwi'r hysbysiad a chael eich cofrestru fel deiliaid caniatâd ar y cyd (e.e. perchnogion tai sydd ar y cyd ac yn unigol yn gollwng elifiant i waith trin carthion preifat cyffredin).

6. Os nad ydych yn siŵr, fe allai fod o gymorth i ystyried y 'person' fel y sawl a fyddai, ar y cyd neu'n unigol, yn gwneud cais am y caniatâd pe bae cais yn cael ei wneud nawr i Asiantaeth yr Amgylchedd. O dan y deddfwriaeth ddiwygiedig, deiliad cofrestredig y caniatâd YN UNIG all wneud cais i'r Asiantaeth yn y dyfodol am amrywio'r caniatâd.

NODYN: Chi sy'n gyfrifol am yr hysbysiad hwn yn llwyr, ac ni fydd yr Asiantaeth yn gyfrifol mewn unrhyw ffordd am gamgymeriadau a wneir ar sail y nodiadau uchod (neu fel arall), sy'n cael eu cynnig yn hollol ddidwyll.

IMPORTANT INFORMATION
PLEASE READ CAREFULLY

ENVIRONMENT AGENCY

LEGAL CHANGES AFFECTING ALL CONSENT HOLDERS AND ANY PERSON RELYING ON A CONSENT FOR ANY DISCHARGES

Reference: Environment Act 1995, Schedule 23, Paragraph 21(2)(b)(ii)

1. ***What is the Environment Agency?***
   The Environment Agency is the largest environmental protection agency in Europe with responsibilities for England and Wales. The Agency was set up by the Environment Act 1995 ('the Act') and from 1st April 1996, amongst its many duties and powers, has inherited all pollution control powers from the former National Rivers Authority (NRA).

2. ***What important information regarding consents to discharge do I need to be aware of?***
   The Act has introduced an important change to the legal status of consents to discharge. In future, a consent given by the Environment Agency will attach to the person (the consent holder/discharger) who makes the discharge(s) and not, as previously was the case, to the discharge itself (i.e. any person making the discharge and relying on the consent).

3. ***So how does all this affect me as a holder of an NRA (or its predecessor) consent?***
   For an interim period from 1st April 1996 until 1st October 1996 your consent will continue to be valid *(Ref: Sch23, para 21(2)(b)(i) of the Act)*. However, after this date, only those persons making the discharge(s) who have given written notice to the Agency that they propose to rely on the consent will keep the legal defence against a pollution offence that the consent provides (subject to compliance with its conditions).

4. ***What happens if I do not give written notice to the Agency?***
   After 1st October 1996, unless we have your written notice, your consent to discharge will lapse and you may be at risk of prosecution for a pollution offence.
   DO NOT DELAY. The Act requires that you **must** write to the Agency if you propose to rely on the consent after 1st October 1996 (even if you are not the current consent holder).

5. ***Is there a standard notice available for me to use?***
   Yes. To help you, the Agency has produced a standard notice which you should use for this purpose and which is enclosed with this information note.
   Please complete the enclosed notice and return it to us at the address given below.

6. ***What if I need help in completing this notice?***
   Notes to help are included at the bottom of the standard notice. However, if in doubt, Agency staff will be happy to assist you. Please write to us at the address below or phone the 'Schedule 23 Help Desk' on the number(s) below and you will be connected to staff who can help.

7. ***What about others making discharges who also rely on my consent?***
   If you are aware of any other person who also relies on your consent, please pass him/her a copy of the enclosed standard notice for completion. If necessary, further copies of the standard notice can be obtained by writing to us at the address below.

8. ***What if the consent holder changes after 1st April 1996 ?***
   If there is a change to the consent holder after 1st April 1996, the legislation will require that you inform the Agency within 21 days of transfer to the new holder. A form is also available for this purpose and may be obtained by writing to us at the address below.

Environment Agency, Rivers House, St.Mellons Business Park, CARDIFF, CF3 0LT.
Schedule 23 Help Desk Tel: 0645 333111 or 01222 770088 (Fax: 01222 798555)

PREMIER TECH AQUA

Operation and Maintenance Manual

Conder CSAF100N20 AG Sewage Treatment Scheme (679268)

Maenan Abbey
Maenan
Llanrwst
Conwy
LL26 0UL

Conder® SAF

SUBMERGED AERATED FILTER

PREMIER TECH AQUA LIMITED, 2 Whitehouse Way, South West Industrial Estate, Peterlee,
Co Durham, SR8 2RA, UNITED KINGDOM +44 (0) 870 264 0004 +44 (0) 870 264 0005
ptauk-sales@premiertech.com WWW.PREMIERTECHAQUA.CO.UK Registered in England and Wales No: 06698049

Certificate No. FM 61567
ISO 9001:2000

PREMIER TECH AQUA

Contents

PREMIER TECH AQUA

1. QUICK INSTALLATION GUIDE

Do:

- Read this O&M Manual for full details
- Use the correct installation guidance for the shell class of the storage tank
  - ATG Horizontal Above Ground Tanks
- Take care when offloading the unit – internal pipework could be damaged
- Ensure adequate operational ventilation is provided for the tanks
- Ensure adequate point of discharge for treated effluent either to a soakaway or to a suitable watercourse
- Where electrical components are installed within the tank provide a suitable cable duct, or install an armoured cable as necessary
- Isolate the main power supply to the control panel before commencing any maintenance works
- Ensure that the pump stations and treatment plant are properly commissioned

2. INTRODUCTION

Thank you for purchasing your Conder® CSAF100N20 Sewage Treatment Scheme Plant. It is designed and manufactured entirely in the UK and is designed to give you long and reliable service.

This manual includes installation, operational and maintenance instructions that will help keep the treatment plant operating efficiently over its service life. In the unlikely event of problems occurring with your plant you may either refer to this manual, your equipment supplier or directly to Premier Tech Aqua Limited (PTAU). This manual is supplied with your plant for the provision of installation, operating and maintenance instructions. It is the responsibility of the end user/operator to read and fully understand the instructions before commissioning or operating the plant and should be referred to by:

- The owner/end user
- The installer
- Installing and servicing electricians
- Maintenance engineers
- Service and desludging contractor

The treatment plant comprises three treatment stages; a primary settlement zone, an aerobic biological treatment reactor zone and a clarification zone to remove heavy humus sludge. The design combines the benefits of a well-proven treatment process with PTAU's engineering expertise to produce a high-quality system that is robust and reliable.

Your attention is drawn to the 'Health and Safety' section of this manual. It is IMPERATIVE that you read these instructions BEFORE working on the plant.

The plant has been designed to treat the volume and strength of sewage specified in the original quotation. Please note the following points:

- The maximum design loading of wastewater must not be exceeded (see loading table for details).
- Surface water must not enter the plant.
- High volume discharges from swimming pools or Jacuzzi's must not enter the plant.
- Large quantities of chemicals such as water softener regenerant, disinfectants, strong acids or alkalis, oil and grease, pesticides or photographic chemicals must not enter the system.
- Do not use chemical or biological emulsifiers in grease traps.

If you have any doubt about a particular substance, please contact Conder or your local supplier for further advice.

PREMIER TECH AQUA

3. DESIGN, DIMENSIONS & DESIGNATION

This Operation and Maintenance Manual includes descriptive literature, specifications and drawings relating to the principal mechanical and electrical equipment incorporated in the unit. It is the responsibility of the operator to read and fully understand these instructions before installing, commissioning or operating the plant. The treatment units are designed for the following maximum loadings:

Process Loadings	CSAF100N20
Max. Hydraulic Load - DWF (l/day)	15000
Max. Organic Load ($gBOD_5$/day)	6000
Max. Ammonia Nitrogen Load (g/d)	800
Peak Flow – max. for 10 minutes (l/sec)	0.5
Max. De-sludge Frequency (days) at full plant loading	90

Dimensions of Standard CSAF	CSAF100N20
O/A Diameter (m)	2.55
O/A Height of unit (m)*	3.4
Distance from Inlet Invert to ground level (m)	2.595
Pipework Fittings (mm)	160

*Height is based on a typical layout, includes the supporting cradles, and is not site specific i.e. does not account for site topography variations. Height does include the for the supporting cradles

4. HEALTH AND SAFETY

4.1. General

The following information is provided in the interests of safety, health and welfare. It is important that this document is retained with the waste water treatment plant. Should the plant and equipment be transferred to a new user please ensure that this documentation is also transferred as well as copies of relevant maintenance records.

4.2. United Kingdom Health and Safety at Work Act 1974

Section 6(a) of this Act requires manufacturers to advise their customers on the safety and the handling precautions to be observed when installing, operating, maintaining and servicing their products.

The user's attention is therefore drawn to the following:

1. The appropriate sections of this manual must be read before working on the equipment.
2. Installation and servicing must only be carried out by suitably trained or qualified personnel.
3. Normal safety precautions must be taken and appropriate procedures observed to avoid accidents including adequate risk analysis.
4. All works associated with the waste water treatment plant must be adequately risk assessed and all appropriate control measures put in place prior to commencement of any works associated with the plant.

Please refer to the relevant Installation Guidelines in the appendices for installation specific guidance and instructions. General non-site specific significant hazards that are associated with the installation and operation of the waste water/sewage treatment plant include but are not limited to:

- Explosive atmospheres
- Falls from working at height
- Confined space working
- Electrical Shock
- Asphyxiation
- Working near, in, or over water
- Exposure to dangerous substances; chemical and biological agents
- Being struck by falling objects
- Moving heavy loads
- Entrapment or crushing by a workplace vehicle
- Bad working positions, often in confined spaces
- Receiving injuries from hand tools
- Handling of rough materials
- Loud noise
- Vibration from tools or vibrating machinery
- Noise

PREMIER TECH AQUA

- Slips and trips
- Inhalation of contaminants
- Micro-organisms, pathogens and their metabolic products that cause infections

4.3. Safety

Suitable dust mask/face masks and cut resistant gloves should be worn when working with glass reinforced plastic.

Before carrying out any maintenance work, the equipment must be electrically isolated.

Electrical work must only be carried out by a suitable qualified electrician.

Sewage and sewage effluent contains micro-organisms and substances harmful to human health. Any person carrying out maintenance on the equipment should wear suitable protective clothing, including cut proof gloves and should have received inoculations against relevant pathogenic organisms; refer to the UK's HSE web page for up to date information.

Good hygiene practice must also be observed.

Temporary barriers and warning signs must be erected around any open covers/manways as appropriate. **DO NOT** leave covers to manways open for any longer than is necessary. On completion of works to any plant all access covers must be replaced.

Adequate work lighting must be provided.

Sewage gases are potentially hazardous. **DO NOT** enter any unit without proper training and without undertaking a confined spaces risk assessment process, with all required equipment and personnel being present. When considering confined space any area of the plant located below ground level should be considered as potentially hazardous.

4.4. Confined Space

Generally, it should not be necessary to enter any of the tanks that constitute the waste water treatment plant under normal working and operating conditions. Adjusting air distribution valves and desludging operations can be performed without entering the plant, entering the plant to do so is a confined space operation and suitable control measures must be in place.

If it becomes necessary to enter any of the waste water treatment plant tank chambers dangers can arise in the confined space because of the following issues:

- A lack of oxygen where heavier gasses or vapours displace breathable air.
- Poisonous gas, fume or vapour that can remain in the tank even after the system is emptied.
- A sudden filling of the tank where there is a failure of the inlet bung during maintenance that may occur during periods of heavy usage or where the drainage network is compromised during rainfall events.
- Fire and explosion hazards from flammable vapours and liquids.

- Residues on the inner surface of the tank that can give off fumes/vapours and could also result in poor footing conditions.
- Hot conditions leading to a dangerous increase in body temperature due to poor ventilation.
- Injuries resulting in falls from a height; the access to the treatment plant is at ground level but the base of the tank could be in circa 3.3 meters (11 foot) deep.

The operator must carry out a suitable and sufficient assessment of the risks for all work activities to decide what measures are necessary for safety. All those involved in the works must be adequately trained in confined spaces and where practical ensure that permits to work and safe systems of work are in place for works within the tank and operations around the tank. The following checklist includes essential elements to be used as a guide that must be considered when preparing a safe system of work; it is generic in nature, not site specific and must not be considered as an exhaustive list:

- Appoint a supervisor with the responsibility to make sure that the necessary precautions are taken.
- Ensure that individuals involved with the works are competent and in adequate physical condition to complete the works. It may be necessary to seek medical advice on an individual's suitability.
- Isolate all mechanical and electrical equipment serving the tank ensuring that shut off valves are locked off and probes removed from the tank or disconnected as necessary.
- To minimise the build-up of gas, vapours and fumes the tank may be cleaned before commencement of the works.
- Ensure that equipment used by operatives is suitable and does not impact on the individual's ability to enter and exit the tank safely.
- Mechanical assist equipment should be considered for access and egress into the tank.
- A suspended working platform or suitable harness will be required for operatives servicing the pipe manifold and associated valves within the tank
- Ensure that all openings to the tank are open and if possible, increase ventilation using forced air/mechanical means to assist in preventing the build-up of toxic gas, vapours and fumes.
- Testing the air may be necessary to check that it is free from both toxic and flammable vapours and that it is fit to breathe with testing being performed by a competent individual.
- Non-sparking tools and specially protected lighting are essential where flammable or potentially explosive atmospheres are likely.
- Breathing apparatus is essential if the air inside the space cannot be made fit to breathe because of gas, fume or vapour present, or lack of oxygen.
- Prepare emergency plans where emergency arrangements will need to cover the necessary equipment, training and rescue operations.
- Rescue harnesses should be provided with lifeline where the lifeline is run back to a point outside the confined space to assist in rescue operations.
- An adequate communications system is needed to enable communication between people inside and outside the confined space and to summon help in an emergency. A suitable competent individual (Top Man) may be required to communicate with anyone inside, raise the alarm quickly in an emergency, and take charge of the rescue procedures

PREMIER TECH AQUA

4.5. Health

It is the customer's responsibility to ensure that all necessary health and safety control measures as well as suitable protective clothing/equipment is available.

As a minimum, it is recommended that the following Protective Equipment (PPE) is used:

- Disposable waterproof overalls
- Gloves (waterproof, cut, tear and abrasive resistant)
- Waterproof safety boots
- Hard hat
- Breathing apparatus (where entry to the tank is required)

Leptospirosis is a disease which can, in rare cases, be contracted from contact with sewage. After operating and maintaining the plant it is imperative that a high level of personnel hygiene (hand washing etc.) is immediately undertaken.

Two types of Leptospirosis infection affect people in the UK.

- Weil's Disease; a serious and often fatal infection that is transmitted to humans by contact with soil, water or sewage contaminated with urine from infected rats.
- L. Hardjo-bovis: Leptospirosis transmitted from cattle to humans.

4.5.1. *What are the symptoms?*

Both diseases start with a flu-like illness with a persistent and severe headache, muscle pains and vomiting. Jaundice appears about the fourth day of the illness.

4.5.2. *How might I catch it?*

The bacteria can enter the body via cuts and scratches and through the lining of the mouth and throat or through the eyes.

4.5.3. *How can I prevent it?*

After having worked in contact with sewage or anything contaminated with sewage, wash your hands and forearms thoroughly with soap and water. If your clothes, boots or tools are contaminated with sewage, wash and disinfect them thoroughly after handling them.

- **Take immediate** action to wash thoroughly any cut, scratch or abrasion of the skin as soon as possible. Apply antiseptic to the wound, cover with cotton wool or gauze, and protect with a waterproof plaster.
- **Do not** handle food, drink or smoking materials without first washing your hands.
- If you contract the symptoms described above after coming in contact with sewage, report it to your doctor immediately and advise him/her of the circumstances.

4.6. Sewer Gases

Sewage gases are potentially hazardous; it may be necessary to open the bioreactor treatment manhole cover to perform routine maintenance. **Take suitable precautions including venting of the unit and the use of suitable personal protection equipment when engaged in these operations.** Work of this nature should not be conducted by an individual; there should be a minimum of two responsible individuals, one performing the task and one "Top Man" available in the event of an incident. All tasks and operations near the waste water treatment plant must be adequately risk assessed.

Generally, **do not enter** the primary tank, bioreactor and humus settling tank associated with the treatment system; where entry is required ensure that operatives are adequately trained, the tank is suitably cleaned and that all operations are adequately risk assessed.

DO NOT keep the access/manhole covers to the plant open for any longer than is necessary. Temporary barriers and warning signs should be erected around any open covers or manways as appropriate. While the tanks are installed underground, there is still a potential for falls from a height and drowning to occur should an individual fall through a manway access.

4.7. Responsibility

The owner of the CSAF100N20 Scheme is entirely responsible for plant operation ensuring correct operation and that the effluent quality does not breach the applicable discharge consent.

Premier Tech Aqua Limited can provide details of approved service partners in your area. These service partners can provide you with a quotation for servicing; Premier Tech Aqua Limited does not engage in or provide operational maintenance and servicing services. The existence of a service agreement with a service company does not transfer responsibility for general maintenance that must be conducted in accordance with the accompanying instructions. Responsibility for the installation and maintenance of the plant remains with the plant owner.

The offloading, correct installation and commissioning of the plant is the responsibility of the plant owner. It is strongly recommended that a contractor that understands and is familiar with CSAF installations and drainage systems is retained to install the plant.

The location and form of the final effluent discharge is the responsibility of the plant owner.

The site suitability assessment, design and installation of soakaway and or final effluent drains remain the responsibility of the owner and should have been completed prior to purchasing the treatment plant.

Emptying of Primary zone and Humus zone in accordance with the recommended de-sludging schedule remains the responsibility of the owner, as does the prevention of the influx of surface water or backing up of the soakaways or treated effluent drains and as such are not covered by any service agreement.

Premier Tech Aqua Limited shall not be liable for any damage or loss, including consequential loss, caused by the failure of any part of the equipment supplied.

PREMIER TECH AQUA

5. PLANT DETAILS

5.1. General

It is the responsibility of the operator to read and fully understand these instructions before installing, commissioning or operating the plant

The CSAF100N20 Above Ground Sewage Treatment Plant comprises the following plant:

- 1№ CSAF100N20/1 Unitank (2.5m diameter 6.273m long)
- 1№ Kiosk housing the CSAF & pump station control systems.

5.2. Plant Physical Characteristics

Table 1: Primary Settling Zone	
Gross Zone Volume (m³)	13.3
Desludging Interval (days)	90
Tank Internal Diameter (m)	2.5m
Plant	Airlift discharging & Sparge Pipework
Power Requirements (Kiosk)	400v/3ph/50hZ
Manway Access Covers	600mm dia GRP Fitted

Table 2: CSAF100N20 Bioreactor	
Gross Zone Volume (m³)	10
Peak Flow (l/s): max. for 10-minute duration	0.5 l/s
Max Hydraulic Load (l/d)	15000
Tank Internal Diameter (m)	2.5m
Manway Access Covers	1800 x 900mm dia GRP Fitted

Table 3: Humus	
Humus Zone Volume (m³)	5
Humus Tank Desludging Interval (days)	De-sludge only when necessary
Tank Internal Diameter (m)	2.5m
Plant in Tank	Top1 re-circulation pump
Power Requirements (Kiosk)	230v/1ph/50hZ
Manway Access Covers	750mm dia GRP Fitted

6. PROCESS AND PLANT DESCRIPTION

6.1. Treatment Process: Submerged Aerated Filter Tech

The biological treatment process is a self-regulating process that requires no specialised operation knowledge for normal running. The plant is specifically designed to treat domestic sewage and other biodegradable waste; it is comprised of three treatment stages:

- Primary Settlement Stage
- Biological Treatment
- Humus Settlement Stage
- Final Effluent Pump Station (Optional)

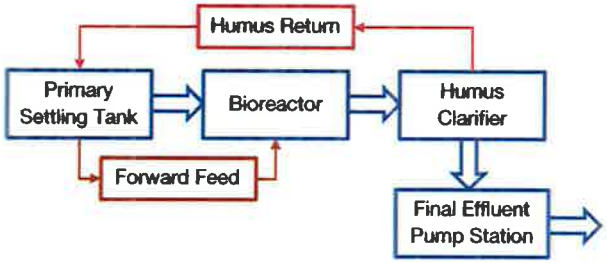

Figure 1: Treatment Process Flow Diagram

Figure 1 is a simplified representation of the process flow diagram for the plants treatment train. The system utilises micro-organisms to break down the sewage. It is very important therefore, that toxic chemicals do not enter the system and "poison" the micro-organisms. Figure 2 is a typical representation of a Modular CSAF plant with a primary settling chamber, a bioreactor and humus clarifier chamber.

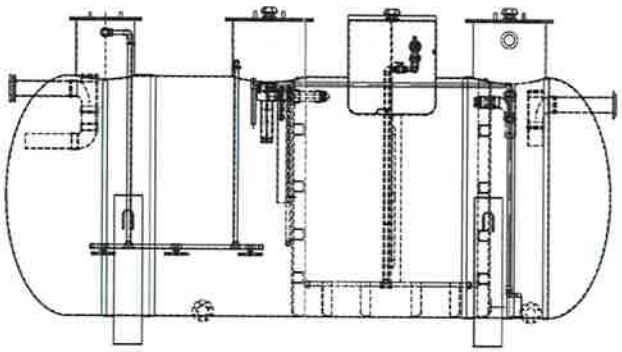

Figure 2: Typical Unitank Tank CSAF System

Raw sewage is first received in the Primary Settlement Zone (PST), where gross solids (primary sludge) separate in the tank. These solids remain in the tank until it is "de-sludged" as described in the 'Maintenance' section of this manual.

The "settled" liquor in the Primary Settling Zone is discharged to the Bioreactor by a combination of gravity flow and by means of an air lift. When there is no gravity inflow to the system air lifts discharge effluent periodically to the bioreactor creating a buffer volume in the primary tank for incoming sewage.

The bioreactor is split into a number of chambers with each chamber being filled with plastic media of a known surface area. This media when submerged provides a surface on which the micro-organisms that biologically treat and break down the waste can grow.

Air blowers located in control kiosks provide necessary oxygen for the micro-organisms to digest the nutrients in the bioreactor. Air is bubbled up through the bioreactor from distribution pipework and in so doing generates a recirculating flow. As the liquid moves around in the biozone it is purified by the micro-organisms growing on the surface of the media. Excess biomass solids are transferred to the humus tank or final settling tank by displacement as new liquor enters the bioreactor from the primary tank.

In the Clarifier / Humus Zone (HT) solids settle to the bottom of the humus tank forming sludge. This sludge is conveyed to the primary settlement stage for co-settlement with the primary sludge, and is removed from the plant as part of normal primary settlement tank desludging operations.

The fully treated liquid, the final effluent, is suitable for discharge to a watercourse or drainage field as defined in the Consent to Discharge issued by the environmental regulator. Where the final effluent cannot "naturally gravitate" away, an optional pump can be incorporated to lift the effluent to the point of discharge.

6.2. Conder® SAF (CSAF) Waste Water Treatment Plant

The waste water treatment plant consists of Unitank system with flanged connections. The bespoke CSAF100N20 general arrangement drawing is as set out in the appendices to this document.

6.2.1. *General*

The instantaneous flow of sewage into the treatment plant should not exceed the peak flow stated in Table 2 i.e. 0.5l/s for a time period not exceeding 10 minutes.

It may be found that the specific application produces lower or higher sewage loads than specified. Consequently, the quoted Conder® SAF may have spare process capacity or could be undersized under which circumstances the plant may fail to achieve the required target consent. It is the responsibility of the end user to ensure that the information provided to Premier Tech Aqua at the plant sizing stage is as detailed as possible to ensure that the treatment plant is sized adequately. Where the plant is expected to be operational before a development is fully occupied the plant must still be designed to cater for the maximum development load.

Premier Tech Aqua requires the removal of Fats Oils & Greases (FOG) from any commercial kitchens prior to the CSAF treatment plant. Grease separators for FOG removal can be supplied by Premier Tech Aqua. Where a FOG management system is proposed please confirm by contact with Premier Tech Aqua that the system is compatible with the operation of the CSAF. Emulsifying FOG management systems are not compatible with the CSAF treatment plant and will adversely affect the operation of the plant and will result in odour problems.

Toxic and Inhibitory Substances: In common with all biological systems toxic and inhibitory substances can adversely affect the CSAF biofilm that in turn can have an adverse effect on the wastewater treatment efficiency possibly killing off the process completely if a sufficient toxic load is discharged to the plant. It is therefore assumed that none of these items are present in the influent to the treatment plant.

Foaming: The CSAF process in normal operation is not readily susceptible to biological foaming events. With all treatment plants, there are certain factors which can lead to foaming events. The most important of these factors are sudden or large changes in influent loading, feed composition (e.g. salts), temperature and nutrients. In addition to biological foaming high levels of surfactants in the influent can trigger short term foaming events

Waste disposal/grinders: If waste disposal units or waste grinders are used in the facilities discharging to the treatment plant the plant loading will be increased. The use of waste disposal grinders is not accounted for in this plant design. Where it is proposed to include waste disposal effluent this information must be made available to Premier Tech Aqua to check suitability of the treatment plant.

6.2.2. *Typical GRP Tank*

Access to the tank internals for normal maintenance is provided through manholes/access covers and the tank is provided with a resin liner ensuring the tank is completely impervious to sewage. The main shell is fabricated with stiffeners suitable for a Class 1 structural shell to ensure a robust construction with a long service life.

PREMIER TECH AQUA

6.2.3. *Primary Settling Zone*

The Primary Settlement Tank stage is designed to settle out any large solids and other insoluble materials. The primary settling stage consists of a single chamber with an air lift to displace settled liquid to the bioreactor with an overflow in case of emergency. Large solids settle to the bottom of the chamber, the forward feed air lift is protected from sending floating scum forward with a baffle around the air lift intake. This section requires de-sludging at the intervals detailed in Table 1 i.e. 90 days (usually the time that is required for the available for sludge build-up volume to fill up with solids assuming daily 100% loading).

The desludging of this tank should take place after thorough sparge of the tank with air to make sure that the solids are in suspension (due to the tank and outlet position – above ground with a side port respectively).

6.2.4. *Sparging in primary*

To avoid solids' solidification, the primary is expected to receive a daily sparge for a short duration on a daily basis. The supply of the air will be realized via the blower that normally provides air in the biozone. A solenoid valve would enable switch of the process air to the primary. The expected split would be 50-50 between the two chambers (primary – biozone).

Sparging of air in the primary is scheduled to take place at 2 am (daily) and will last for 10 minutes. A switch for manual operation is provided so the end-user/operator would be able to manually alter or enable sparging. This should be considered during desludge of the plant.

The supply of the air to the primary will be carried out via 3 plate diffuser 9fine bubble) pointing directly to the bottom of the tank. Coarse bubble was not used to avoid sludge pulverization. These 3 diffusers are positioned to a level that will minimize the probability being covered with sludge when this will be at its maximum expected level (90 days build up at 100% loading).

During operation of this arrangement the pressure is expected to fluctuate (go lower) compared to the pressure at normal conditions. For this reason, the low-pressure switch has its low limit at 70 mbar corresponding to the minimum water distance in the primary, the distance between the diffuser outlet and port of the airlift translated to pressure.

6.2.5. *Bioreactor*

The submerged aerated media is contained within this zone. The media comprises loose profiled tubes which provide a very large specific surface area. Sewage and air is distributed within the media via the blower and air distribution pipework. This ensures that sufficient quantities of aerated sewage pass the biological effective surface area of the media.

The bioreactor is sized to cater for the expected loading as set out in the information used to determine the size of plant required. Generally, the plant is considered as reasonably robust and can handle load variations as low as 20% of the nominal daily loading. Where it is expected that loading rates may be lower than the 20% of nominal load for extended periods of time (several days and more) then the operation of the plant may be adversely affected; please contact Premier Tech Aqua for advice.

6.2.6. *Ammoniacal Nitrogen Reduction*

Ammoniacal nitrogen reduction takes place in the bioreactor towards the end of the treatment train within the reactor. Generally, the reduction takes place once the majority of the organic (BOD_5) loading is reduced. The following conditions are required to achieve and sustain biological nitrification and are assumed present/available where nitrification is required. It is noted that in areas of soft water alkalinity dosing may be required to maintain adequate conditions for ammoniacal nitrogen reduction:

- Sufficient Alkalinity (in excess of seven times the ammonia to be reduced)
- High levels of dissolved oxygen
- Wastewater incoming pH of 6 – 8
- Wastewater temperature of not less than 10°C
- Absence of any substances that inhibit nitrification

6.2.7. *Humus Clarifier*

Humus sludge is the product of settlement of effluent and is mainly bacterial and fungal material sloughed from the filter media. It forms part of the total sludge production of the plant and is normally returned to the head of the works for further treatment or co-settlement. This is achieved via two number pumps installed within the final settlement zone of the Humus tank. Should desludging of the Humus Tank be required it is recommended that it is de-sludged after the primary settling tank with its contents transferred to the empty primary settling tank.

6.2.8. *Air Supply in the biozone*

Air supply side channel blowers are in the relevant treatment plant control kiosk and these side channel blowers operate twenty-four hours a day all year round. Treatment supply air is directed to the plant from the kiosk through 50mm hoses (supplied with the plant) located in suitable ducting. The laying of the ducting and the pulling of the hoses is the responsibility of the installing contractor.

The blowers need a supply of fresh air to keep oxygen levels high in the bioreactor. Each blower is fed with air through a filter drawing air through ventilation slots in the control kiosk. Care must be exercised when selecting the right location for the kiosk serving the treatment plant to ensure that there is sufficient air flow to serve the blowers and to ensure that the kiosk is adequately ventilated to prevent excessive temperatures developing within the kiosk.

The air hoses connect to air distribution manifolds located within the bioreactor tank. The air distribution manifold consists of spurge pipes with valves to distribute the air in the tank and to allow a means of adjusting the air flow within each bioreactor chamber.

retrofitting; PTAU do not accept responsibility for any problems or costs incurred in such circumstances.

6.2.9. *Noise*

The air blowers will generate noise in the region of 65dBA at one meter from the blower. While some sound attenuation is achieved with the control kiosk it is recommended that the location of the treatment plant and associated control kiosks are located with due consideration of the impacts of the plant on sensitive noise receptors. Sound damping can be applied to the kiosk; however, noise reductions will not exceed 10dBA. PTAU do not provide noise modelling

services and where sensitive receptors are a concern the end user should engage the services of a suitable qualified acoustic engineer to design adequate sound and noise screening.

6.2.10. *Electrical Items*

Electrical work must only be carried out by a suitable qualified electrician. The kiosk houses the treatment plant side channel air blower, controls and the electrical connections for the plant. The side channel blower is supplied with power via the electrical control panel and the blower runs continuously to supply oxygen to the treatment process. In addition, there are extra controls for forward feed airlift, spurge pipework and sludge return pump located in the control kiosk.

The electronic control panel incorporates the mains isolator, alarm contacts, and terminals for the CSAF. Please note that the installer is required to provide dedicated mains supply to the control panel and the supply must be fitted with D-rated fuses.

6.2.11. *Plant Kiosk and Control Panels*

The control panel serving the plant has integrated pump station controls with an interlocked incoming supply isolator, making it impossible to remove the cover without first electrically isolating the control panel. Ensure when working on the CSAF that power to the Kiosk is isolated to avoid electrical shock and where practicable a lock out system should be used.

The control panel incorporates a number of alarm controls:

- Mains power failure
- Blower high pressure
- Blower tripped
- Blower low pressure
- Air filter restriction
- Pump Tripped

6.3. Electrical Installation

The end user's or installing contractor's electrician is responsible for bringing power to the treatment plant control kiosk. Kiosk and plant power requirements are as set out in the appendix and should be consulted to ensure correctly sized wiring and ducting is provided.

It is not possible to state a specific installation configuration that would suit all sites. To ensure a safe and cost effective installation, the selection of current protection devices must remain the responsibility of the installer as the person best qualified to assess site conditions and supply configuration. It is therefore imperative that electrical installation of this equipment is entrusted to a fully qualified electrician. When installing the electrical supply the following points should be considered; please note that *failure to comply with the following will result in the invalidation of the product warranty:*

- The supply to the plant should be provided through a dedicated circuit via isolation and protection devices consistent with the requirements for fixed equipment and in accordance with the latest regulations issued by the Institution of Electrical Engineers;

- The supply to the plant should be fed through a dedicated MCB. Earth Leakage Devices provided for normal domestic protection must not form part of the supply circuit to this plant;
- All connections made to the junction enclosure should be via correctly sized and rated glands;
- Check all power terminations for tightness prior to commissioning. Loose connections will cause localised overheating with the possibility of fire. (Electrical connections can loosen in transit or as a result of fixing methods used during installation).

6.4. Air Distribution in the biozone

The air distribution within the bio-zone is sensitive to the tank and consequently the air distribution manifolds being installed level. Ideally equal quantities of air should come from each of the distribution points, this can be judged quite effectively by observing the streams of bubbles from ground level above the biozone during the commissioning stage.

Each manifold is provided with a main shut off that can be adjusted to distribute more or less air to either manifold. Reducing the air flow to one manifold by partially closing one of the manifolds will increase the flow volume to the other manifold.

Each of the air distribution sparge pipes is fitted with a ball valve that can be used to adjust the air flow within each sparge pipe on the manifold. Should it transpire that there is an uneven distribution across the biozone the valves on the side with the larger volume of air can be partially closed resulting in more air flow to the sparge pipes with fully opened valves. The air distribution across the width of the biozone can be tuned to give an even distribution by applying fine adjustments of the sparge pipe valves.

The following is of importance during maintenance operations where it may be necessary to direct the output of the blower down one sparge pipe to clear a blockage or check the operation of the plant.

Always ensure that at least one sparge pipe ball valve is in an open position on each of the manifolds as a minimum. NEVER close both manifold shut off vales completely while the blower is running; this could cause a failure of the blower or damage the manifolds. Additionally, always check that the manifold shut off valves are opened when starting the plant from a shut-down state.

7. OPERATION

7.1. General

Every care is taken to ensure that all mechanical components are correctly fitted and adjusted prior to leaving the factory; however, transportation and installation may result in the movement of components and the alteration of valve settings. It may be necessary to re-adjust valves and fasteners prior to starting the plant.

As part of the installation and operation the plant must be inspected and where it is considered that any components require adjustment the adjustments must be made prior to commissioning or as part of maintenance.

PREMIER TECH AQUA

A competent suitably qualified service company(s) must be retained to commission the plant and to perform periodic general maintenance, servicing and desludging in accordance with the requirements of this manual. The commissioning company does not need to be the same company that provides periodic maintenance; however, evidence of correct commissioning and a valid current maintenance agreement in addition to copies of maintenance logs must be available to PTAU on request else the plant warranty may be void

7.2. Commissioning Guidelines

7.2.1. *Installation Checks*

On removing the covers from the bioreactor check the following:

- ☐ Are the plant internals correctly located as they may have moved in transit?
- ☐ Is there any debris/bungs in pipework that needs to be removed?
- ☐ Do tanks and extensions show any signs of distortion as a result of ground pressure?
- ☐ Are the air hoses correctly terminated with hose tails and the restraining clips tightened such that the hoses are properly restrained?
- ☐ Are the air valves on the air manifolds and sparge pipes in the fully open position (NB never close all of the sparge pipe valves and never fully close all of the valves in the bioreactor manifolds as this will damage the air distribution system)?
- ☐ Is the water level in the horizontal tanks within approx. 300mm of the outlet invert?
- ☐ Is sewage flowing into the tank (there must be no waste entering the tank at this stage)?

7.2.2. *Control Panel Checks*

The following checks must be completed by a suitable qualified and competent person; ensure the power supply to the control panels is isolated prior to commencement:

- ☐ Are all cables correctly terminated and is the earth protection adequate on the CSAF control panel?
- ☐ Are the wiring diagrams located in the control panel kiosk?
- ☐ Are air hoses correctly terminated with hose tails and the restraining clips tightened such that the hoses are properly restrained?
- ☐ Are the forward feed air lift settings correct?

7.2.3. *Commissioning Documentation and Records*

The installation and commissioning checklist must be retained by the end user and must be made available to Premier Tech Aqua on request on foot of a warranty claim. Where this checklist and documentation are not made available on request it will invalidate the warranty claim. Note where an installer has their own paper copy of the commissioning checklist and documentation please include copies of these documents with this manual.

7.3. Start Up

The unit must be commissioned before sewage enter the system. Note that once the plant is commissioned it will take between 6 and 8 weeks for the biomass to establish itself under reasonable weather conditions; poor weather and winter conditions will extend the time it takes the biomass to become established. After installation, the waste water treatment part of the plant should have been left full of 'clean' water, power should be connected to the control panel, treatment plant and any ancillary equipment. The following checks/actions must be performed:

- ☐ Check that waste water treatment plant (primary, bioreactor and clarifier tanks) are full of water.
- ☐ Ensure that the bioreactor manifold shutoff valve and the individual sparge pipe shutoff valves are fully open/adjusted.
- ☐ Electrical connections and cabling should be checked by a qualified electrician.
- ☐ Ensure that the blowers and CSAF tank air hoses and nylon tubes are connected.
- ☐ Check that a copy of the control O&M documentation is located in the document holder in the kiosk.
- ☐ Switch on the main power supply in the kiosk to the blowers, one blower should start-up as the system is served by a duty and standby arrangement. The blowers serving this system should **not** run continuously together.
- ☐ Check for any control panel errors; refer to the 'Fault Finding' section of this manual if errors are detected.
- ☐ Check that the air supply to the bioreactors is adequate; where the air supply is not constant over the bioreactor adjust the individual sparge pipe valves as necessary to regularise the air flow in the reactor.
- ☐ Test the forward feed air lift from the primary settling tank to each of the CSAF bioreactors; open the outlet end manway and visually confirm the operation of the air lift. Feed rates are factory set and must not be changed.
- ☐ Test the humus return pump from the CSAF humus clarifier, open the manhole cover to which the sludge discharges and visually confirm the sludge is being returned to the primary when it is running. Feed rates are factory set and must not be changed.
- ☐ Remove the thermostat box cover and ensure that the thermostat temperature controls are correctly set. There are three thermostat controls; kiosk ventilation fan on/off, blower overheat shut-off control and blower restart temperature setting.
- ☐ Where checks are satisfactory close all manway covers on completion of the checks and ensure the control kiosk is closed and locked.

7.4. Shut Down

Temporary absence of flow will not be detrimental to the operation of the waste water treatment plant as the plant will continue to recycle flows within the system. Considering circumstances where the flow may be interrupted for several weeks or more the plant operation must be modified or may need to be shut down where it is expected that interruption will be circa two months. To ensure that the operation of the treatment plant is

preserved when it comes to start up the plant again it must be decommissioned or shut down by the following procedure:

- De-sludge the primary tank (and humus tank if necessary) in accordance with the instructions in the 'Maintenance' section of this manual.
- Refill the primary settling tank (and humus clarifier where necessary) with 'clean' water.
- Turn off all power to the treatment system.
- Ensure that the power to the lifting stations and treatment plant is locked out.

In these instances, clean water does not mean potable water and a combination of unpolluted recovered rainwater, water from a watercourse or other water free of floating contaminants, toxic or inhibitory substances may be used. Swimming pool or effluents with high concentrations of surfactants such as grey water are not considered adequate.

8. MAINTENANCE

Please read and the requirements of the Section 2, Health & Safety before attempting any work on the treatment system. Premier Tech Aqua recommends that a professional service company that understands treatment plants and drainage systems is used to service the plant. All maintenance records for the treatment plant must be maintained on site by the end user. Failure to present copies of the maintenance logs on request it will invalidate any warranty claim and could adversely affect the product warranty.

8.1. Operational Inspections

8.1.1. *Weekly Inspection*

- Check the operation of the Blowers. Remove the manhole cover over the bioreactor and confirm that aerated liquor is being circulated through the media. This will be noticed by air bubbles rising in the biozone. If the air distribution is uneven then the air manifold needs to be adjusted.

- Check and confirm that there are no leaks from the exposed pipework.
- Check the final effluent discharging from the unit. If it is cloudy or contains suspended particles, the humus tank is likely to require desludging.
- Check the blower air supply filter for any noticeable blockages or damage and replace if necessary.
- Ensure that any landscaping or natural growth around the control kiosks is not interfering with the kiosk ventilation.

8.1.2. *Monthly Inspections*

- Check the operation of the air lift from the primary settling tank and from the humus clarifier to the CSAF bioreactor units by lifting the manhole and observing the air lift in operation.
- Check that the pre-filters are operating correctly, liquid levels in the primary tank will be higher than expected and there will be no gravity flow from the primary chamber to the bioreactor in the event that the pre-filters are blocked. Where the pre filters are not operating correctly please see the pre filter maintenance requirements.
- Inspect the blower air filter, clean and if necessary replace them. The lifespan of air filters is dependent on the local environment; in dusty locals, it will be necessary to clean and replace the filter frequently.
- Inspect the status of aeration at the primary (bubbling shape and direction, uniformity).

8.1.3. *3 Monthly Inspections*

- Switch off the power supply and padlock the mains isolator in the control kiosks.
- Inspect the air distribution manifold, clean and if necessary replace the blower air filter.
- Ensure that the water level in the biozone is above the media level
- Check the operation of the Blowers. Remove the manhole cover over the bioreactor and confirm that aerated liquor is being circulated through the media and adjust if necessary.
- Check and confirm that there are no leaks from the exposed pipework.
- Check the final effluent discharging from the unit. If the effluent is cloudy or contains suspended particles, the humus tank is likely to require desludging.
- Ensure the landscaping around the control kiosks is not interfering with the kiosk ventilation.
- Remove the pre filters and perform the required cleaning maintenance operation.
- De-sludge the primary settling zone of the treatment plant while the pre filters are removed.

8.2. De-sludging Operations

8.2.1. *General*

The primary settling zone, and on occasions the humus clarifier, require emptying of sludge periodically. When operating at the normal daily load the normal desludging frequency is 90

days. Where the treatment system is overloaded the desludging-frequency will need to be reduced.

The primary settling tank must be de-sludged to **remove floating scum and 100% of the contents** of the working tank volume. Once the tank is empty it must be filled with 'clean' water immediately. *Failure to fill the tank with water will result is scum blocking the air lift and adversely affecting the plant and voiding the tank warranty.*

The humus clarifier does not always need to be desludged unless the effluent quality begins to degrade. Where the humus tank needs to be desludged the contents can be used to part recharge the primary settling tank.

A log must be kept recording the frequency of desludging and what was desludged i.e. primary and clarifier tanks. These logs must be maintained on site and surrendered for inspection in the event of a warranty claim. Where these documents are not made available it will invalidate any warranty claims.

The waste must be removed in accordance with the requirements of "The Waste Management Code of Practice" where there is a duty of care on the end user/waste producer to ensure the waste hauler is registered and licenced by the EA.

Prior desludging the primary the operations team should sparge the tank manually with air. We recommend that sparging for 30 minutes would be more than enough to create enough turbulence to allow all build up solids come into suspension. This will enable the team to empty most, if not all, of the mixed liquor minimizing the likelihood for left over solids in the stream.

For good practice, it would be ideal if the plant would be switched off during the desludging procedure to ensure that no solids will flow through the biozone. It is not crucial if this is not attainable, however, it is likely that solids may flow with the effluent for short period of time after emptying.

9. WARRANTY

Premier Tech Aqua ltd. Warrant that the GRP structure of the tank(s)/vessel(s) including internal GRP parts and fittings supplied when installed in strict accordance with the installation guidelines:

1. Will meet our published specification and will be free from material defects and workmanship for a period of (1) year following date of original delivery by us.
2. Will not fail for a period of (20) years from date of original delivery due to external corrosion.
3. Will not fail for a period of (20) years from date of original delivery due to internal corrosion, provided that the tank(s) is / are used solely for the storage of the materials, at the designed parameters, as stated in the quotation.

4. Will not leak for a period of (1) years from the date of original delivery due to structural failure, which shall be defined as breaking or collapse, provided that the installation is in accordance with our published installation guidelines, or variations thereof with our prior written approval.

Our liability under this warranty shall be limited to, at our option:

1. Repair of the defective tank to the original agreed specification.
2. Delivery of a replacement tank to the point of original delivery.

Our liability under this warranty does not cover:

3. Third Party Labour costs.
4. Installation costs; direct or indirect.
5. Indirect or consequential damages in connection with such tanks.

Premier Tech Aqua ltd. Warrants that the mechanical and electrical equipment supplied with the product, if installed in accordance with our recommendations, are warranted for a period of 1 year from dispatch of equipment provided that the plant is installed, commissioned, operated and maintained in accordance with the operating and maintenance instructions. Our liability under this warranty shall be limited to, at our option:

1. Repair of the defective mechanical or electrical equipment.
2. Replacement of the defective mechanical or electrical equipment.

Our liability under this warranty does not cover:

1. Third Party Labour costs.
2. Installation costs; direct or indirect.
3. Indirect or consequential damages in connection with such mechanical or electrical equipment.

The foregoing constitutes our exclusive obligation and we make no express or implied warranties, or any warranty of merchantability or fitness for any particular purpose whatsoever except as stated above. All equipment is supplied in line with Premier Tech Aqua ltd. Standard terms and conditions of sale.

PREMIER TECH AQUA

10. APPENDIX A: FAQ & FAULT FINDING

Fault	Potential Cause	Corrective Action
General	Can the tank be entered to fix broken or damaged contents?	Under normal operating circumstances do not enter the tank. Where the tank must be entered for inspection, maintenance or repair the works must be performed by suitably qualified and competent individuals with confined space training.
	In the event of an electrical fault who does the end user call to correct the problem?	In the event of an electrical fault the end user should first make contact with their retained service provider. The service provider should determine the need to seek specialist assistance (such as electrician).
	Is it safe to work on and near the plant?	Operating and working on or near the plant is acceptable once that all required SOP and risk assessment control measures are adhered to. Ensure that adequate consideration is given to the plant and equipment used as the applied load may exceed the SWL of the tank and this should be considered by the end user.
	Something has fallen into the bioreactor tank?	Do not attempt to enter the tank: Small items are unlikely to result in a major problem unless they are likely to damage or block the air diffuser pipework. For floating debris use a net to fish out the item. For ferrous metals use a strong magnet, tied to a suitable pole, to retrieve the item.
	Something has fallen into the primary settling tank or the humus clarifier tank	Do not attempt to enter the tank: Small items are unlikely to result in a major problem unless they are likely to damage or block the air lift pipework. For floating debris use a net to fish out the item. For ferrous metals use a strong magnet, tied to a suitable pole, to retrieve the item.
	There is a problem with the plant; can media be removed from the bioreactors?	Media can be removed from the bioreactor to facilitate work on the air distribution pipework or the tan shell. Media can be removed by hand or can be removed by suction pump. It is likely that media removed by suction will need to be replaced as the removal operation can damage the media.

	It is proposed to connect a water softener to the plant; will this be possible?	Not all water softeners are compatible with the operation of the waste water treatment plant. Please refer to Premier Tech Aqua with details of the proposed water softening product to check suitability.
	The treatment plant is connected to an old sewer network that includes combined sewage; will this adversely affect the plant?	Surface water runoff must not be permitted to enter the treatment plant. All surface water runoff form the combined sewer must be identified and removed from the system else the treatment plant will be adversely affected.
	A large volume of surface water has discharged through the plant; will this adversely affect the operation of the plant?	Surface water runoff will adversely affect the operation of the treatment plant. Check the condition of the bioreactors; a sufficiently high flow will strip the bio media from the reactor and will displace the bio-media within the reactor towards the bulkhead at the downstream end of flow. This will need to be repositioned and it will be necessary to have your maintenance contractor inspect the plant for signs of serious damage or faults. Check the primary settling tank for signs of in-organic rubbish that could block the primary tank outlets and air lifts.
CSAF100N20: Blowers not running	Blower(s) stop after a relatively short operating period and remains off	Check that the power supply to the relevant blower is switched on at the relevant control panel. If switch is on call your service agent. Your service agent will determine if a qualified electrician is required to visit the site and check for an electrical fault or if the blower motor is burned out.
	During hot weather the blower(s) periodically start and stop throughout the day	The CSAF control system includes thermal shutoff of the blowers in the event that the maximum safe operating temperature is exceeded. This is standard operation and the blower(s) will start and stop depending on the kiosk temperature. Ensure that the kiosk forced ventilation fan is operating. This fan reduces the operating temperature within the kiosk; where the temperature exceeds the CSAF mechanical plant operating temperature blower operation is suspended. The blowers will start again automatically once the kiosk temperature reduces below the limiting value.

PREMIER TECH AQUA

		Ensure that the kiosk ventilation openings are not blocked. Ensure that the kiosk thermostat controls are correctly set; if the shutdown temperature is less than the restart temperature setting then the blowers will shut down but will not restart. If you think that the temperature control settings are not correct please contact your service agent.
	Blower tripped error	Switch off the power and reset the electrical supply MCB. Switch the plant on and the system should restart automatically. If it does not restart switch off the power and call a qualified electrician.
	Blower(s) stop shortly after starting and do not re-start (filter headloss/restriction error)	Check the condition of the blower air supply filter located on the side of the kiosk. The filter includes a pressure sensor that will turn off the blower if the pressure loss across the filter is too high. Replace worn or clogged filters and reset the system.
	Blower tripped out due to power cut	Do nothing; when the power is restored, the system will restart automatically.
	High pressure alarm	Check the air supply hose from the kiosk to the bioreactors for blockages or kinks. Check the operation of the bioreactors; poor air distribution can be an indicator of a blockage. Check the liquid level within the plant; liquid levels higher than normal within the plant will increase the hydraulic plant pressure. High liquid levels within the plant indicate a blockage on the outlet.
	Low Pressure Alarm	Check the air supply hose connection from the kiosk to the bioreactors for tears and poor fitting hose clamps. Check the liquid level within the plant; liquid levels lower than normal within the plant will give a low pressure warning. Low liquid levels within the plant indicate a leak in the plant or the primary settling tank and/or the humus clarifier have not been refilled. If there are no apparent causes then the low pressure limit setting may need to be adjusted; this can happen in rare cases and is generally

		site specific where your site is at either a high or low altitude.
CSAF100N20: Power Supply	Power supply fault or electrical phase failure (electrical phase error)	Switch off the power and turn the power on again; the system should restart. Where a fault is identified as a phase failure fault turn off the power to the plant and contact your service agent to arrange an inspection by qualified electrician. It is highly unlikely that this fault is as a result of the plant operation and it is usually an indicator of a fault in the power supply network to the plant or the site.
CSAF100N20: Bioreactor Aeration	Blower tripped out	See 'Blowers not running'
	Power supply fault	See 'Power supply fault or electrical phase failure (electrical phase error)'
	Aeration pipework	Ensure all of the CSAF Bioreactor aeration valves are not closed. This will prevent air supply to the process and will burn out the blowers in addition to invalidating the plant warranty. Valves should only be turned off completely during maintenance operations to clear blockages and even then there should be at least one valve fully open. This form of maintenance work must only be performed by your service agent. Check if blowers are running and air is being discharged from the blower pressure release valve. Examine the air distribution pipework and hoses; where a blockage is discovered in a drop leg (or more than one) contact your service agent to perform cleaning and maintenance. It may be necessary to connect a compressor to the affected manifold and blow out the blockage adjusting the valves to direct the air flow to the affected drop leg and sparge pipe. This operation must only be performed by your service agent else you risk invalidating your plant warranty.
	Uneven air distribution in the biozone	Readjust the bioreactor air distribution manifold valves until there is an even distribution of air across the biozone; this is best done by your service agent.

PREMIER TECH AQUA

CSAF100N20: Foaming in the Plant	Process start-up	Foaming is a natural part of the plant maturation process and will subside over time. If foaming is excessive anti foam agent can be used.
	Normal Operation (Care must be taken not to aggravate foaming by making too many process changes during the event. Changes such as excessive desludging can often make the situation considerably worse. If the foam is stable, constant in level and not overflowing then to observe and do nothing is probably the best course of action).	Even with good process control, occasional foaming problems can be experienced at almost any activated sludge plant, sometimes without any clearly identifiable cause. A check should be made on the pH and alkalinity. It is possible that the peaks in ammonia loading are sufficiently high to exhaust the available alkalinity causing depression of the pH. If the pH goes significantly below 7 it can trigger foaming and a decline in the condition of the sludge. Foams from a poorly biodegradable surfactant source are generally transitory (less than 48 hour duration) and are accompanied by elevated levels of foam in the final effluent. Foaming resulting from seawater, excessive soluble loads or toxic chemicals entering the plant at elevated levels; this foam slowly abates after the chemicals that caused the reaction have passed through the plant. If the chemical contamination was sufficiently harsh or extended in duration the biomass may have been killed off and your service agent should inspect the plant. Foam generated from Filamentous bacteria often appears without warning over a few days. In many cases this can be associated with changes in the process or operating parameters of the plant; increases in phosphate, change in the loading, a dose of something toxic, rapid temperature change, or seawater ingress can trigger the onset of stable foam. If left alone filamentous foams generally reach a peak then gradually subside over a period of 3-6 weeks.
CSAF100N20: Plant Problems	There is a dry crust on the surface of the primary settling tank	The crust on the surface of the primary settling tank is normal and will be removed during desludging operations.

		Ensure during desludging operations that the tank is filled as soon as is possible after desludging to prevent solids breaching the air lift baffle and adversely impacting the operation of the forward feed air lifts.
	There is a dark brown sludge on the surface of the humus clarifier.	Settled sludge within the final clarifier is not being returned to the primary settling tank or is building up in the clarifier. Desludging of the humus tank will be required to correct the problem. Check the operation of the humus return air lift in the humus clarifier tanks and ensure that the air lift hoses have been connected to the correct fittings and not the compressor fitting on the main air supply manifold.
	There is a malodourous 'septic sewage' smell from the treatment plant bioreactors	Confirm that the treatment plant air supply blowers are operating. Check the liquid level within the bioreactor is at normal levels, downstream blockages will cause the plant to surcharge and adversely affect the operation of the treatment plant. If the plant and aeration is adequate contact your service agent as testing of the effluent may be required as it is likely that the plant has suffered a toxic or inhibitory substance shock. For other faults such as little or poor air flow see the relevant fault in the table. Where the correct maintenance procedures and schedules have not been adhered to then it is likely that solids have passed into the bioreactor and it will be necessary to empty the bioreactor of media to clear the excess solids build-up; this will have invalidated your plant warranty.
	The final effluent is cloudy	Review the desludging schedule and organise for desludging of the primary settling tank and the humus clarifier. Ensure that the humus sludge return system is operating.
	The ammoniacal nitrogen in the final effluent is higher than normal	The removal of ammoniacal nitrogen increases the acidity of the effluent. If the effluent alkalinity is reduced sufficiently it will adversely affect the treatment process and can result I higher levels of ammoniacal nitrogen in the effluent.

PREMIER TECH AQUA

		On the basis of the results of laboratory testing the effluent stream may require dosing with suitable base material to increase the liquor alkalinity to required levels. Alternatively it may be necessary to source additional waste for the treatment plant as the plant may be substantially under loaded.
	There is a grey white growth near the effluent headwall	The biological process is overloaded and the effluent is not as per the discharge consent. Check the general plant operation. Look for signs of toxic chemicals having being discharged to the plant. Once the cause of the failure is identified and corrected it will take several weeks for the biomass to fully develop.
	There is a 'rainbow' sheen on the plant effluent	Hydrocarbon or light liquids have been discharged to the plant. Review the operation of the plant; hydrocarbon loading can kill off the biomass if the influent is left unchecked. For minor occurrences the plant should recover from small discharges. Ensure that potential sources of major spills are identified and eliminated.
	The treated effluent has failed suspended solids discharge limits but the other parameters are ok?	If the treatment plant is not served by a suitable sampling chamber with a 150mm head difference between the inlet and outlet of the chamber then it is likely that the sample has been contaminated during the sampling process; it only takes a small amount of contamination to throw out the figures and this can result by simply touching the container off of any part of the manhole or if the sampling contained comes in contact with any build-up of residue as can accumulate in the pipe. Alternatively see faults relating to the humus clarifier and sludge return system.