

# MATRIX

Sewage Treatment Systems



**BSEN 12566-3\***

**Certified Performance to 96.2% efficiency**

## **MODELS**

**CLF1 (6pe) to CLF17 (300pe)**

## **INSTALLATION, OPERATION AND MAINTENANCE MANUAL**

**\*Applies to models CLF1 – CLF7 only**



## **INTRODUCTION**

Congratulations on the purchase of your **MATRIX** Treatment System. It is designed and manufactured exclusively by **Clenviro Limited** in the UK, with quality, reliability and efficiency being prime objectives of our company.

We ask that you take time to fully read this manual to ensure that all the installation requirements are met and the operating principles are fully understood so that you can enjoy a trouble free system.

It is extremely important to read the health and safety information before working on the treatment plant.

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**NOTE:** If you require any further information regarding any aspect of our products, please contact our Customer Services Department 0800 32 888 52

## PERFORMANCE RESULTS

### Clenviro Ltd

Unit 1C, Queensway Business Park, Telford, Shropshire, TF1 7UL  
England

### EN 12566-3, Annex B

Results corresponding to the Irish National Annex for IS EN 12566-3

### Small wastewater treatment system MATRIX CLF

Submerged fixed film process

Test report PIA2008-093B49

Nominal organic daily load*	0.34 kg/d		
Nominal hydraulic daily load	1.20 m³/d		
Material	polypropylene		
Watertightness (Annex A)	pass		
Structural behaviour (pit test)	pass (also wet conditions)		
Durability	pass		
Treatment efficiency (nominal sequences)		Efficiency	Effluent
	COD	91.4 %	56 mg/l
	BOD <sub>5</sub>	96.2 %	11 mg/l
	SS	95.5 %	16 mg/l
	NH <sub>4</sub> -N**	83.3 %	5.9 mg/l
Electrical consumption	1.4 kWh/d		

\*at a test influent of  $\geq 300$  mg/l BOD<sub>5</sub> (mean)

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

Performance tested by:

**PIA – Prüfinstitut für Abwassertechnik GmbH**  
(PIA GmbH)  
Hergenrather Weg 30  
52074 Aachen, Germany

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



Notified Body  
No.: 1739



Certified according to  
ISO 9001:2008



Prüfinstitut für Abwassertechnik GmbH  
*geprüft - tested - testé*

Elmar Lancé

January 2016

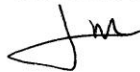
## 3.3.5 Results

Plant reference	MATRIX CLF 7					
Declared date of manufacture	08/07/09					
Maximum authorised depth of backfill	65 cm					
Condition of use	Not within the water table (dry ground conditions)			Within the water table (wet ground conditions following testing in dry ground conditions)		
Observed characteristic	Visual assessment	Volume	Deformation	Visual assessment	Volume	Deformation
Before test	/	$V_{1dry} =$ 20 970 litres	/	/	$V_{1wet} =$ 20 128 litres	/
After being buried for 24 hours	/	$V_{1'dry} =$ 20 662 litres	- 1,5% (after 24 hours)	/	$V_{1'wet} =$ 20 120 litres	- 0% (after 24 hours)
A the end of the test	No failure No deformation at connections	$V_{2dry} =$ 20 128 litres	$\Delta_{dry} =$ $V_{2dry} - V_{1'dry} =$ - 534 litres i.e. - 2,6% of the initial volume (after 3 weeks)	No failure No deformation at connections No loss of watertightness	$V_{2wet} =$ 20 032 litres	$\Delta_{wet} =$ $V_{2wet} - V_{1'wet} =$ - 88 litres i.e. - 0,4% of initial volume (after 3 weeks)  $\Delta_{total} =$ $V_{2wet} - V_{1dry} =$ - 630 litres i.e. - 3,0% of initial volume (after 6 weeks)

Table 1. Results of the structural behaviour test (Pit Test)

This test report only certifies the characteristics of the sample submitted for testing and makes no judgement about the characteristics of similar products. It does not, therefore, constitute product certification under article L 115-27 of the French consumer code and of the law of 3 June 1994. The specifications of the reference standard are given for information.

Test carried out by:



L. MORCET LAMARCHE

Test Manager:



S. POUDEVIGNE



### **Certificate of Conformity & Guarantee**

This certificate confirms that all Matrix Sewage Treatment Systems are covered by a one year blower warranty and a twenty five year tank warranty, **commencing from the date of delivery.**

All MATRIX Sewage Treatment Systems are designed and built to the requirements of BS6297 with systems referenced to CLF1 to CLF7 (6 – 50pe), additionally being fully certified and tested to BSEN12566-3, achieving a process efficiency rating of 96.2%. Which relates to a final effluent quality of 11mg/litre BOD : 16mg/litre Suspended Solids : 5.9mg/litre NH<sub>4</sub>.

Unless otherwise stated all Matrix Sewage Treatment Systems are designed to produce a final effluent quality of 20mg/litre BOD : 30mg/litre Suspended Solids : 20mg/litre NH<sub>4</sub>, subject only to the unit operating within the stated design parameters and being maintained in accordance with recommendations.

Every MATRIX Sewage Treatment System is fully identifiable and traceable by a serial number located in the blower housing.

Manufactured within a certified ISO9001 Design & Build Quality Management System, extruded welds are spark tested and thoroughly checked prior to dispatch.

Internal pipework is pressure tested.

This product is guaranteed as being free from any manufacturing defect.

All warranties are subject to the product having been installed in accordance with guidelines issued by the manufacturer and the equipment being used within the stated design parameters. Warranty cover is also subject to the equipment not having been misused or abused and that any routine maintenance required having been carried out in a timely fashion by authorized engineers. Any bought in component parts included in this product are subject to that manufacturer's warranty, deemed to be not less than 12 months, unless specifically identified separately.

Clenviro Ltd reserve the right to limit any valid warranty claim to repair or replacement of the defective component only and do not accept any responsibility or liability for consequential costs or damage.

## **HEALTH AND SAFETY**

## **Section 1**

United Kingdom Health and Safety at Work Act 1974

Section 6a 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 drawn to the following:

1. The appropriate sections of this manual must be read before working on the equipment.
2. Installation must only be carried out by suitably trained/qualified personnel.
3. Normal safety precautions must be taken and appropriate procedures observed to avoid accidents.

Refer to **Clenviro Ltd** or your local distributor for any technical advice or product information.

## **HEALTH**

The following is extracted from a health warning card supplied to all **Clenviro Ltd** staff. It is the client's responsibility to ensure that all necessary protective clothing/equipment is available.

Leptospirosis Are you at risk?

What is Leptospirosis?

Two types of Leptospirosis affect people in the UK.

Weil's disease. This is a serious infection that is transmitted to humans by contact with soil, water or sewage which has been contaminated with urine from infected rats.

Hardjo type Leptospirosis which is transmitted from cattle to humans.

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.

How might I catch it?

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

How can I prevent it?

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

Take immediate action to wash thoroughly any cut, scratch or abrasion of the skin immediately. 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 after coming into contact with sewage, report to your doctor immediately and advise him/her of the circumstances.

## **SAFETY**

Sewage gases are potentially explosives and toxic. **DO NOT** enter any of the below ground compartments of the Sewage treatment plant.

Before carrying out any maintenance work, the equipment **MUST** be electrically isolated at the fuse box from which the blower power supply is derived.

Do not leave covers open for any longer than necessary. Temporary barriers and warning signs should be erected around any open covers or manways as appropriate.

## **PLANT DESCRIPTION & PROCESS**

## **Section 2**

The **MATRIX** range of treatment systems for residential population equivalents up to 300 persons are a "unitank" design comprising a primary settlement stage, a biological filtration zone and a final settlement zone, within a single structure.

### **THIS MANUAL REFERS SPECIFICALLY TO TREATMENT PLANT MODELS CLF1 (6pe) to CLF17 (300pe)**

The treatment plant will provide long and trouble free operation provided the simple installation and maintenance procedures are adhered to.

Your attention is drawn to the Health and Safety section in this manual. It is imperative that you read these instructions carefully before attempting to carry out any work on the system.

The treatment plant has been designed to treat the volume and strength of sewage specified in the original quotation and as detailed in the technical data section of this manual. To ensure that the plant continues to operate efficiently, your attention is drawn to the following points:

- DO NOT** exceed the maximum design loading of the plant.
- DO NOT** allow surface water to enter the system.
- DO NOT** allow high volume discharges such as from swimming pools or jacuzzis to enter the system.
- DO NOT** allow large quantities of chemicals such as water softener regenerant, disinfectants, strong acids or alkalis, oil and grease, pesticides or photographic chemicals to enter the system.
- DO NOT** use chemical or biological emulsifiers in grease traps.
- DO NOT** allow fats, oil or grease from catering applications to enter the system.

If you have any doubt about a particular substance, please contact the Customer Service Department at **Clenviro Ltd** for further advice. 0800 32 888 52



## SCOPE OF SUPPLY

## Section 2

The **MATRIX** system comprises the CLF treatment unit itself and an enclosure containing an air blower unit with a mains power connection point and comes complete with 10m of airline and a failure alarm, as standard.

### CLF Unit

This comprises a single tank containing all the components required for the sewage treatment process.

The CLF tank is manufactured in Elite Fabrication Grade Polypropylene and is supplied in a standard black colour. It is completely impervious to water and sewage and has been designed and independently tested to ensure a robust construction and a long service life. The tank is provided with a locking manhole cover, providing access to all parts of the unit.

The submerged filter beds comprise of plastic pieces of filter media, randomly packed into the tank. The media is made from UV stable polypropylene and provides a large surface area on which the bacteria, required for the purification process, can grow. The media is supported on an open mesh panel fixed above the base of the tank.

A fine bubble air diffuser is located underneath the filter bed(s) this is connected to the external air supply (blower) by uPVC pipework and a braided hose airline.

In most CLF units we incorporate recirculation systems which is a uPVC pipe running from the final settlement and media sections back to the primary settlement section.

The pipework has a tapping at its top where tubing is inserted down the uPVC pipe which is connected to the blower. On models which incorporate a media section continuous recycle (CLF5 to CLF17) a control tap in the 8mm air line inside the treatment plant ensures a correctly balanced air flow between the air lift recirculation pipe and the diffuser in the submerged filter zone. On models CLF3 to CLF17 there is a timed recirculation system from the final tank back to the primary settlement section. This is factory set, do not alter.

### Blower

The blower is mounted along with its associated electrical controls inside a weatherproof enclosure.

The electrical controls comprise an isolator and a loss of air alarm connected to an external beacon which will provide a visual warning that the blower is not operational.

On models with a pumped discharge fitted there is also a high level/pump failure alarm and beacon. See pages 28-29-30.

### NOTE :

**Clenviro Ltd** operate a policy of continuous product and process development and reserve the right to change specifications without prior notification.

## INSTALLATION INSTRUCTIONS

### Section 3

Please read the Health & Safety, section 1 of this manual before attempting to work on the system.

**Note:** The **CLF** tank should be stored with access covers in place to prevent accumulation of rainwater within the unit.

### **IMPORTANT**

**The siting of a treatment plant must be agreed with the Building Regulation department of the local authority prior to installation. Similarly, the discharge from a treatment plant will require a Discharge Permit from the Environment Agency if the volume of discharge is greater than 5.0m<sup>3</sup>/day direct to watercourse, or 2.0m<sup>3</sup>/day to soakaway. This must be obtained before installation. Consideration must also be given to the need for access for desludging the unit by tanker**

## MECHANICAL INSTALLATION

Note: Please refer to drawing CLFINSTAL, Drawings, section 8 of this manual.

The following instructions are offered for guidance only. It is for the customer/contractor to satisfy themselves that installation is in accordance with the prevailing ground conditions and regulatory requirements.

**Clenviro Ltd** can accept no responsibility for incorrect offloading or installation.

**The contractor is responsible for offloading all items of equipment with due regard to the following:**

**DO NOT** use chains or wire ropes.

**DO NOT** lift the tank if it contains any water.

**DO NOT** subject the tank to sharp impacts.

**DO** check that all items delivered correspond with the packing note.

The CLF unit is provided with lifting eyes or lifting slings on the outside of the tank. These are not intended for transportation of the units. The lifting hook should be connected to the tank lifting eyes by separate slings of equal length. **Ensure that the slinging angle does not exceed 60° at the hook in order to eliminate excessive compressive loads on the side of the unit.**

When working in a deep excavation, make sure that all necessary safety precautions are taken to ensure the stability of the excavation and provide safe working conditions for site personnel. The only time anyone needs to be working at the bottom of the excavation is when levelling the base and ensuring that the first backfill is correctly placed.

## **MECHANICAL INSTALLATION** (continued)

## **Section 3**

It is the responsibility of the installer to determine the thickness and strength of concrete required to suit the ground conditions, taking into account the buoyancy of the unit when being desludged, external forces exerted by the water table, backfill, traffic loading, etc.

The installation should be carried out in accordance with the requirements of the Construction and Building Regulations. An inspection chamber should be installed upstream of the Matrix CLF unit.

During the course of the installation, the following minimum equipment will be required:

Normal construction equipment and plant.

Concrete to C20P and semi dry to 30mm slump.

An adequate supply of water to fill the unit at the same rate as backfilling.

Dewatering equipment as necessary.

Set of lifting straps of correct length and adequate SWL.

**Please Note : The foul drain to the treatment plant MUST have a traditional open soil/vent pipe at the head of the drain run. Air admittance valves, tile or ridge vents are NOT acceptable.**

Excavate to the CLF tank dimensions allowing a minimum clearance of 150mm between the unit and the excavation sides. Excavate to the appropriate depth for the installation ie. depth of the unit plus 150mm minimum concrete thickness (actual thickness to suit ground conditions). NOTE : The standard inlet invert depth of all Matrix CLF units is 600mm (unless a deeper inlet invert has been requested at time of order). If the invert of the inlet drain is deeper than this **Clenviro Ltd** must be made aware at time of order so that the unit can be manufactured to suit.

Lay and level the concrete base for the tank to a minimum of 150mm thickness.

Lift the tank into position using slings, taking care not to damage any external flanges or pipework. Ensure correct orientation of the inlet and outlet pipework. Check that the tank is level in all directions. Commence backfilling with concrete in 500mm lifts, and at the same time, **fill each tank compartment with water starting with the media bay section**, ensuring that the progressive concrete and water levels are approximately equal ( never exceed a difference of 200mm max ). The concrete must be evenly distributed around the unit, ensuring spigot connections are not covered at this stage. **Never partly or wholly fill the tank with water before surrounding it in concrete.**

**Note: Do not use vibrating poker to compact the concrete.**

## **MECHANICAL INSTALLATION** (continued)

## **Section 3**

Make all interconnecting pipework connections, ensuring a minimum pipe gradient of 1:70.

Continue placing the concrete in 500mm lifts, terminating at the shoulder of the unit. Allow an initial set of the concrete between lifts and wait at least 24 hours for the concrete to harden.

Ensure a duct (usually standard 110mm drain pipe) is laid from the 110mm 'Air Inlet Duct' connection on the neck of the treatment plant, to the desired position of the Blower unit. This is for the airline only (and discharge pump cables if fitted) and is to ensure complete protection of the airline. On models CLF1 to CLF4 a single 110mm airline duct connection is provided, directly facing the diffuser pipework connection inside the treatment plant, to allow the airline to be connected in a straight line.

The airline **MUST** be cut to length. **Do not** leave excess airline curled up in the treatment plant, this can be detrimental to efficient blower operation and will invalidate blower warranty.

On models CLF5 to CLF17 we provide a choice of airline duct connections (either side of the access upstand) to ensure the shortest and most direct connection of the airline from the blower to the diffuser connection. The airline duct connections are set back from the diffuser pipework connection to allow for a 'long radius' arc of the airline, which again **MUST** be cut to length.

**Do not use short radius 90° bends on the airline duct.** There are NO electrical components within the treatment plant unless you have requested the option of a pumped discharge. Ensure the blanking cap (supplied) is fitted to the unused airline duct connection.

On all Matrix treatment plants which have a pumped discharge, a pump failure alarm is supplied as standard. On the 6, 9 and 12 person systems this consists of a high level alarm float in the final chamber which must be connected to the alarm box provided.

The alarm float and pump float have been factory set, **DO NOT**, under any circumstances, alter the position or length of these float switches.

On all other Matrix models the pumped discharge consists of a full duty/standby twin pump set-up and the failure alarm is built into the auto changeover panel (with external beacon) supplied with the system.

**If the treatment plant is to be installed in a trafficked area, guidance should be sought from Clenviro Ltd before the treatment plant is ordered as an alternative method of manufacture is required.**

**Standard Matrix Treatment Systems are NOT suitable for vehicular applications.**

**The blower housings for models CLF1 to CLF5 should be positioned on 'soft landscaping' not paving slabs or hardstanding areas.**

**All other units will require a properly constructed housing plinth.**

## ELECTRICAL INSTALLATION (Blower Unit)

## Section 3

In order that you achieve a safe and cost effective installation, it is not possible to state a specific installation configuration that would suit all sites. The selection of current protection devices must remain the responsibility of the installer. It is imperative that electrical installation of this equipment is entrusted to a fully qualified electrician. The blower unit can be positioned wherever is most convenient bearing in mind the need to get a power supply to it and the airline from it to the treatment plant. If a pumped discharge has been requested on the treatment plant, the cable from the pump can be fed back up the airline duct to the blower unit within which is the electrical connection for the pump. Most pumps come complete with 10 meters of cable. The blower unit is supplied with 10 meters of airline as standard.

**The airline duct MUST be sealed with expanding foam when installation is complete or the blower warranty will be invalidated.**

When installing the electrical supply to the CLF blower unit, the following points should be considered:

The supply to the CLF unit should be by means of a dedicated circuit with isolation and protection devices consistent with the requirements for fixed equipment and in accordance with the latest regulations of the Institute of Electrical Engineers.

The supply to the CLF unit should be independent of all protection devices other than the supply authority's fuse and that provided specifically for the CLF power supply. In particular, earth leakage devices provided for normal domestic protection must **not** form part of the supply circuit to the CLF Unit.

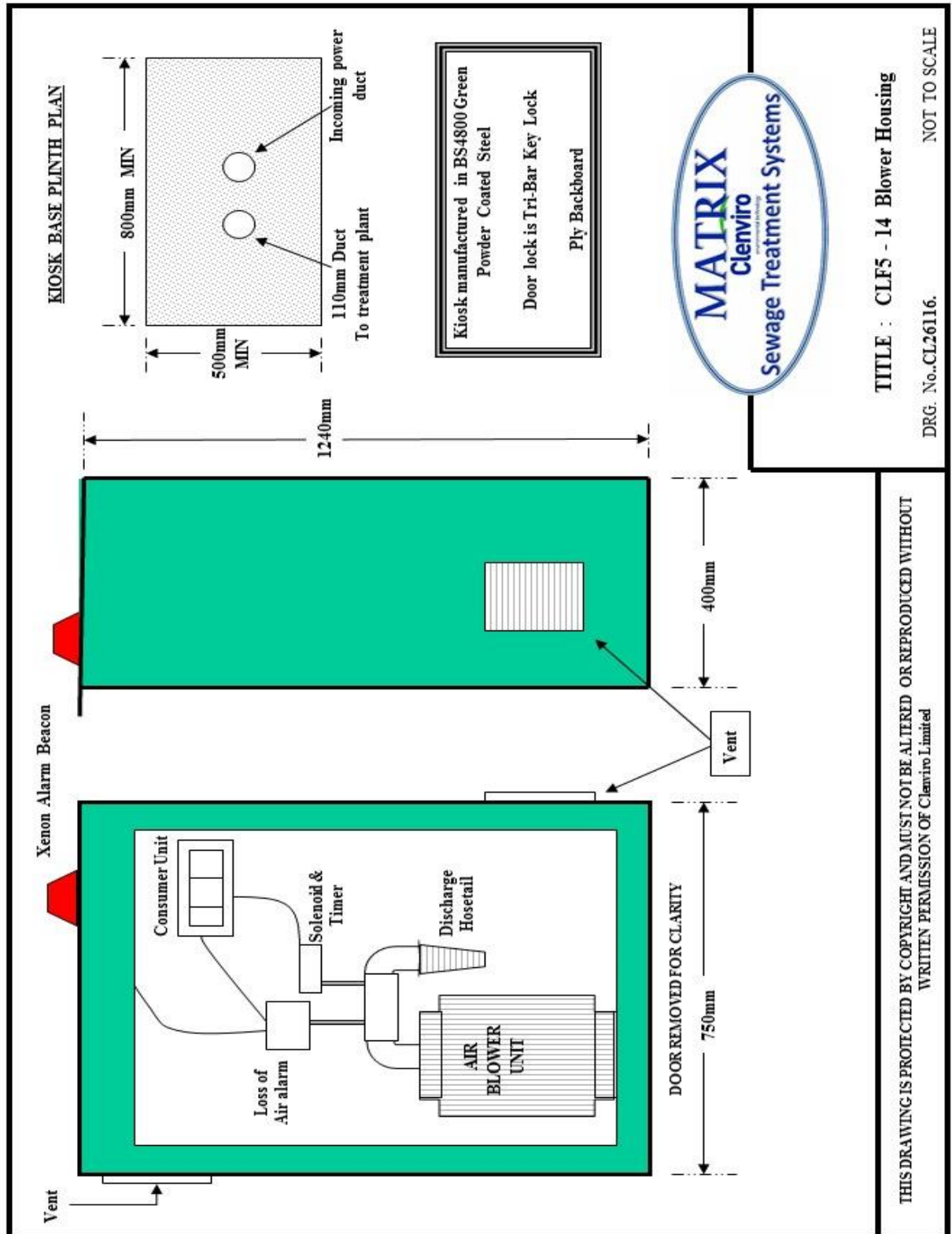
### CLF1 to CLF5 Blower Housing

See Technical Data Section for electrical connections and alarm wiring.





**CLF 6 – 15 BLOWER HOUSING**



## OPERATING SEQUENCE

### Section 4

The **MATRIX** Sewage treatment plant is specifically designed to treat domestic sewage and other biodegradable waste in a simple and compact system comprising three basic stages, namely:

Primary settlement

Biological Filtration

Final settlement

The **MATRIX** system utilizes microorganisms growing on the surface of the filter media to breakdown the sewage. It is very important that toxic chemicals such as those listed in the Introduction (section 2) do not enter the system and poison the microorganisms.

Raw sewage flowing to the CLF unit is received in the primary settlement zone. Here, gross solids (primary sludge) settle to the bottom of the tank, where they remain until the tank is desludged as described in the Maintenance Schedule, section 6 of this manual. The settled sewage displaced from the primary zone then flows into the submerged filter zone, passing under a scum baffle.

Flow circulation in the submerged filter zone is generated by the hydraulic effect of the outlet air diffuser. This causes settled sewage entering the filter zone at high level to be drawn down through the media, aerating the sewage in the process. The flow circulation ensures that the influent sewage receives several passes through the filter bed at low flow.

In the filter zone, as the sewage passes over the filter media it is purified by micro-organisms growing on the surface of the media. Growth of these micro-organisms results in an excess which is shed as solid particles known as humus solids. Humus solids settling at the bottom of the filter zones are recirculated with the flow of incoming sewage and are deposited on the top of the primary settlement zone.

Sewage displaced from the submerged filter zone flows via a DIP pipe into the humus settlement zone. Liquid displaced from the humus zone has now been fully treated and is known as final effluent. It is suitable for discharge to a watercourse or soakaway as defined in the consent to discharge issued by the Environment Agency.

Humus solids from the final settlement tank are recirculated to the primary tank via the recirculation pipework. This helps reduce the sludge build up in the humus tank and prevents stagnation during very low inflow.

## PLANT START UP / SHUTDOWN PROCEDURE

## Section 5

### PLANT START-UP

1. Fill the plant with clean water until there is a discharge from the outlet.
  2. Connect the airline from the blower unit to the receiving hoesail inside the neck of the treatment plant and ensure the connections are airtight
  3. Check the blower ventilation is unobstructed.
  4. Turn on the main power supply to the blower unit.
  5. Turn the isolator switch inside the blower housing to the on position. This will start the blower running.
  6. It will take a minute or so for the pressure to build up in the system depending on the distance of the blower from the treatment plant.
  7. Check that bubbles are breaking the surface in the filter media section of the treatment plant.
  8. Where installed the flow regulator tap (green) on the airlft recycle is factory set to achieve an effluent return rate of not quite a constant flow. This may need adjustment due to temperature conditions or distance of blower from the treatment plant.
- NOTE: It will take about a minute between adjustments for a change in flowrate. The desired setting is where the flow only just 'spitting' back. **Under no circumstances must this tap be fully open or the flow constant, as this will detrimentally affect the process performance of the treatment plant.**
9. If a discharge pump is fitted, check for operation.
  10. Fit the manhole cover and lock if necessary.

The CLF Unit is now in an operational state. However, the treatment process relies on the growth of microorganisms on the filter media. The time taken for these naturally occurring organisms to develop is dependent on temperature and may take up to six weeks in winter. Until the biomass is fully developed, the treatment process will be incomplete. During this time do not allow any strong cleaning agents or bleaches to enter the system.



## **PLANT SHUTDOWN**

## **Section 5**

Temporary absence of flow to the plant will not be detrimental as the air lift will continue to recycle sewage within the system. However, if the flow of sewage to the plant will be interrupted for more than two months, the following procedure should be completed:

1. Desludge the primary and humus tank compartments in accordance with the instructions in the Maintenance, section 6 of this manual.
2. Refill the plant with clean water.
3. Fit the manhole cover and lock if necessary.
4. Stop the blower by turning the isolator switch to off.
5. Switch off the power supply to the blower enclosure.

## **MAINTENANCE**

## **Section 6**

### **OWNER RESPONSIBILITY**

The owner of the sewage treatment plant is entirely responsible for the operation of the plant and for ensuring that the quality of the effluent does not breach the Environmental Permit Standards issued by the Environment Agency

Matrix Treatment Systems only require minimal maintenance but like anything, if it is going to fail it will only do so on a Sunday or Bank Holiday. Most of our maintenance recommendations are purely a visual inspection.

You are reminded that the existence of a service agreement does not transfer responsibility for general maintenance, which must be conducted in accordance with the accompanying instructions.

Soakaways, drains and the emptying of primary tanks remain the responsibility of the treatment plant owner.

If the plant appears not to be operating correctly, refer to the Fault Finding, section 7 of this manual or contact **Clenviro Ltd** for advice

### **MAINTENANCE SCHEDULE**

#### ***WEEKLY***

1. Check the operation of the blower. If the blower has failed for any reason other than a mains power failure the warning beacon will be flashing

#### ***MONTHLY***

Carry out the weekly check plus:

1. Check the operation of the diffusers (bubbles rising in the Biological zone).
2. Check the recycle flow into the inlet zone if fitted.  
Look at the liquor being returned, it should run clear by the end of its cycle.
4. Check the inlet and outlet stilling zones are clear of debris.( remove any obstructions)
5. Check the blower ventilation is un-obstructed
6. Check the biomass growth on the filter media. The biomass should be a light brown colour, not white or grey. The odour in the plant should be 'earthy'. There should not be a noticeable 'rotten eggs' smell.
7. Check the final effluent. If this is cloudy or contains many suspended particles, then the humus tank is likely to require desludging.

## **MAINTENANCE SCHEDULE** (continued)

## **Section 6**

### ***6 MONTHLY / ANNUALLY***

Carry out the weekly and monthly checks plus:

1. Check the primary settlement tank with a probe, the top floating crust blanket should not exceed 200mm thick, arrange desludge if required
2. Desludge the primary and final tank every 12 months\* and desludge the biozone every 24 months\*. This should be done by an experienced local waste disposal tankering company. \* This applies to CLF units 1, 1A, 2, 3 & 4. Larger systems will require de-sludging more frequently depending on loading and type of application.
3. The tanker suction hose should be carefully lowered into the primary and final chambers ensuring all settled sludge is removed.
4. When desludging the biozone carefully lower the suction hose down the triangular section (rectangular in larger units) where the air diffuser pipework goes down making sure not to damage the pipework. Ensure the hose is down to the base of the tank so that all settled biomass sludge can be removed.
5. After desludging each compartment, it is essential that the unit is filled up with water. This can be done by using a hosepipe or by running several taps in the household(s).
6. Remove air filter from the blower unit (remove top cover to access filter), clean and replace.
7. It is the manufacturers recommendation that the diaphragms in the small blower units are replaced every 18-24 months.

See general layout drawings 'CLF1-17 Desludge' in the technical data section for desludge points

Repeat the Plant Start-up Procedure, section 5 of this manual.

**1. THE BLOWER IS NOT RUNNING**

	<b>Cause</b>	<b>Remedy</b>
1.1	Power cut.	If temporary do nothing. When the power is restored the system will restart automatically
1.2	Power supply RCD has tripped.	Switch off the power and reset the RCD, Switch on and the blower should restart automatically. If it doesn't, switch off the power supply and call an electrician, on 3 phase supply check correct rotation.
1.3	Blower runs Intermittently	Check air vents are clear and the airline is not kinked as overheating in the enclosure will cause the high temperature trip to switch off the power until cool.

**2. AIR BUBBLES ARE NOT RISING FROM THE DIFFUSER**

	<b>Cause</b>	<b>Remedy</b>
2.1	Blower is not running.	Refer to fault condition 1.
2.2	Blower running	Check all valves open, and all air lines are not broken or leaking.

**3. THERE IS NO RECIRCULATION FLOW FROM THE HUMUS TANK COMPARTMENT**

	<b>Cause</b>	<b>Remedy</b>
3.1	Blower fault.	Refer to fault conditions 1 & 2.
3.2	Recirculation pipework is blocked	Use a wooden pole to agitate any sludge which has settled around the bottom of the recirculation pipework in the humus tank. If there is a substantial level of sludge, then desludge the humus tank as described in the Maintenance Schedule, section 6 of this manual.
3.3	The air control jet is blocked	Remove and clean the jet. In cleaning the jet ensure the orifice is not enlarged.

## TECHNICAL DATA

## Section 8

Model No	CLF1 (6pe)	CLF1A (9pe)	CLF2 (12pe)	CLF2A (15pe)	CLF3 (18pe)
Max Daily Flow	0.9m <sup>3</sup>	1.35m <sup>3</sup>	1.8m <sup>3</sup>	2.25m <sup>3</sup>	2.7m <sup>3</sup>
Total Daily BOD Load	0.36kg	0.54kg	0.72kg	0.9kg	1.08kg
Population Equivalent	6	9	12	15	18
Overall Depth (STD)	1956mm	1959mm	1959mm	1959mm	1962mm
Diameter	1500mm	1700mm	1900mm	2000mm	2200mm
Inlet Invert level (STD)	600mm	600mm	600mm	600mm	600mm
Outlet Invert level (STD)	650mm	650mm	650mm	650mm	650mm
Cover Size	900mm <sup>2</sup>	900mm <sup>2</sup>	900mm <sup>2</sup>	900mm <sup>2</sup>	2 x 900mm <sup>2</sup>
Blower Rating	60w/240v	60w/240v	80w/240v	100w/240v	120w/240v
Discharge Pump (Optional)	0.2kw/240v	0.2kw/240v	0.2kw/240v	0.2kw/240v	2 x 0.2kw/240v
Desludge Frequency* (Based on full load)	365 days	365 days	365 days	180 – 365 days	180 – 365 days
Inlet Connection	110mm	110mm	110mm	110mm	110mm
Outlet Connection (Gravity)	110mm	110mm	110mm	110mm	110mm
Outlet Connection (Pumped)	50mm/MDPE	50mm/MDPE	50mm/MDPE	50mm/MDPE	50mm/MDPE
Weight (empty)	200kgs	250kgs	300kgs	325kgs	500kgs

\*Desludge frequency assumes residential application with full daily design loading

Model No	<b>CLF4 (25pe)</b>	<b>CLF5 (30pe)</b>	<b>CLF6 (40pe)</b>	<b>CLF7 (50pe)</b>
Max Daily Flow	3.75m <sup>3</sup> /day	4.5m <sup>3</sup> /day	6.0m <sup>3</sup> /day	7.5m <sup>3</sup> /day
Total BOD Load	1.50kg/day	1.80kg/day	2.40kg/day	3.00kg/day
Population Equivalent	25	30	40	50
Overall Depth (std)	1912mm	1912mm	1912mm	1912mm
Width (inc ribs)	2500mm Diameter	1624mm	1624mm	2124mm
Length (inc. ribs)	N / A	4100mm	4500mm	5100mm
Inlet Invert (Std)	600mm	600mm	600mm	600mm
Outlet Invert	650mm	700mm	700mm	700mm
Blower Rating	120w/240v	200w/240v	0.37Kw/240v	0.70Kw/240v
Discharge Pump rating (optional)	0.2kw/240v	0.2kw/240v	0.2kw/240v	0.2kw/240v
Desludge Frequency* (Based on full load)	180 days	180 days	180 days	180days
Inlet Connection	160mm	160mm	160mm	160mm
Outlet Connection (Gravity)	160mm	160mm	160mm	160mm
Outlet Connection (pumped discharge)	50mm MDPE	50mm MDPE	50mm MDPE	50mm MDPE
Weight (empty)	750kgs	1200kgs	1400kgs	1700kgs

\*Desludge frequency assumes residential application with full daily design loading.

Model No	CLF8 (60pe)	CLF9 (70pe)	CLF10 (80pe)	CLF11 (90pe)	CLF12 (100pe)
Max Daily Flow	9m <sup>3</sup>	10.5m <sup>3</sup>	12m <sup>3</sup>	13.5m <sup>3</sup>	15m <sup>3</sup>
Total BOD load	3.60kg/day	4.20kg/day	4.80kg/day	5.40kg/day	6.00kg/day
Population Equivalent	60	70	80	90	100
Overall Depth (std)	1912mm	1912mm	1912mm	1912mm	1912mm
Width (inc. ribs)	2124mm	2124mm	2124mm	2124mm	2524mm
Length (inc ribs)	5600mm	6000mm	6600mm	7500mm	7500mm
Inlet Invert (Std)	600mm	600mm	600mm	600mm	600mm
Outlet Invert	700mm	700mm	700mm	700mm	700mm
Blower Rating	0.70kw	0.70kw	0.70kw	0.70kw	0.70kw
Desludge Frequency *	120 days	120 days	120 days	120 days	120 Days
Inlet Connection	160mm	160mm	160mm	160mm	160mm
Outlet Connection	160mm	160mm	160mm	160mm	160mm
Outlet (pumped)	50mm MDPE	50mm MDPE	50mm MDPE	50mm MDPE	63mm MDPE
Weight Empty	2000kg	2200kg	2400kg	2600kg	2900kg

\*Desludge frequency assumes residential application with full daily design load

Model No	<b>CLF13 (125pe)</b>	<b>CLF14 (150pe)</b>	<b>CLF15 (200pe)</b>	<b>CLF16 (250pe)</b>	<b>CLF17 (300pe)</b>
Max Daily Flow	18.75m <sup>3</sup>	22.5m <sup>3</sup>	30m <sup>3</sup>	37.5m <sup>3</sup>	45m <sup>3</sup>
Total BOD	7.50kg/day	9.00kg/day	12.00kg/day	15.00kg/day	18.00kg/day
Population Equivalent	125	150	200	250	300
Overall Depth	1912mm	1912mm	1912mm	2412mm	2612mm
Width (inc. ribs)	2524mm	2524mm	2524mm	2524mm	2524mm
Length (inc ribs)	9000mm	10500mm	12000mm	12000mm	12000mm
Inlet Invert (Std)	600mm	600mm	600mm	600mm	600mm
Outlet Invert	700mm	700mm	700mm	700mm	700mm
Blower Rating	0.75kw (240v)	1.1kw (240v)	1.1kw (240v)	1.5kw (415v)	2.2kw (415v)
Desludge Frequency*	120 days	120 days	120 days	120 days	90 Days
Inlet Dia	160mm	160mm	160mm	160mm	160mm
Outlet Dia	160mm	160mm	160mm	160mm	160mm
Outlet (pumped)	63mm MDPE	63mm MDPE	63mm MDPE	63mm MDPE	63mm MDPE
Weight Empty	3100kg	3300kg	3500kg	3700kg	3900kg

\*Desludge frequency assumes residential application with full daily design load.



## **MATRIX PACKAGE SEWAGE TREATMENT PLANT**

### **PROCESS DESCRIPTION**

#### **INFLUENT DESIGN PARAMETERS.**

DWF (Dry Weather Flow)	=	As data sheet
Peak Design Flow	=	3 x DWF
Organic Load	=	As data sheet
Nature of Influent	=	CRUDE SEWAGE
PH Range	=	6 – 8
Standard Effluent Quality	=	20mg / L BOD : 30mg / L SS : 20mg/L NH <sub>4</sub>

**ALL SURFACE WATER MUST BE EXCLUDED. – NO WASTE DISPOSAL UNITS IN USE**

**AN EFFECTIVE GREASE TRAP MUST BE INSTALLED ON ANY COMMERCIAL KITCHEN DRAINS eg.: HOTELS / RESTAURANTS**

The “Matrix” treatment plant is of unitank design and incorporates Primary Settlement (PST) Biological Treatment (Biozone), and Final Settlement (FST) within the same structure, allowing delivery to site as a complete unit to provide for a simple and straightforward installation. No other tanks are required except for larger applications ( over 300 p.e. ) where a modular system is provided or where additional treatment may be required to achieve more stringent effluent quality standards or where effluent re-use is proposed.

The "Matrix" Treatment plant has been designed to optimize the aesthetic qualities of the final installation by ensuring that there is minimum visual impact. The "Matrix" process is designed in accordance with the requirements of BS 6297 and certified to BSEN 12566 – Pt3 achieving an average final effluent quality of 11mg/litre BOD : 16mg/litre SS : 6mg/litre NH<sub>4</sub>.

#### **PRIMARY SETTLEMENT TANK**

The primary settlement tank is a two stage tank designed to maximize the removal of gross and suspended solids prior to transfer of the settled effluent to the biozone for treatment. The primary settlement tank also incorporates for a sludge storage volume (based on full load) depending on the desludge periods as identified for individual applications.

## BIOZONE

The biological treatment phase utilizes BAF technology (biological aerated filter) which incorporates two proven principles of biological process in the form of a fixed film reactor for process stability and a suspended floc dispersed growth system for high transfer rates and operational control, to ensure a stable treatment process which is largely unaffected by shock loads.

The process incorporates a submerged, high rate, plastic media on which a fixed film of biomass is grown. This film takes nutrition from the incoming settled effluent and is provided with oxygen by means of a small blower unit which aerates the media through HDPE membrane diffusers to provide fine bubble aeration.

The action of the fine bubble aeration is carefully controlled to provide optimum oxygen transfer rates and to provide a scouring action to slough off excess biomass to keep the thickness of the fixed biological film at optimum levels, thereby preventing the production of anaerobic bacteria and ensuring maximum process efficiency.

The fact that the media remains submerged allows for an element of suspended floc dispersed growth which basically means that there will be biomass which is “unfixed” to the media but achieves treatment through suspended aeration.

The biozone incorporates a two stage process as standard that allows for constant mixing of incoming settled effluent to provide optimum treatment stability and to avoid any “short-circuiting.”

The use of a two stage biozone ensures a high degree of process efficiency to not only reduce B.O.D. levels to that required, but will also achieve reductions in ammoniacal nitrogen in excess of standard requirements.

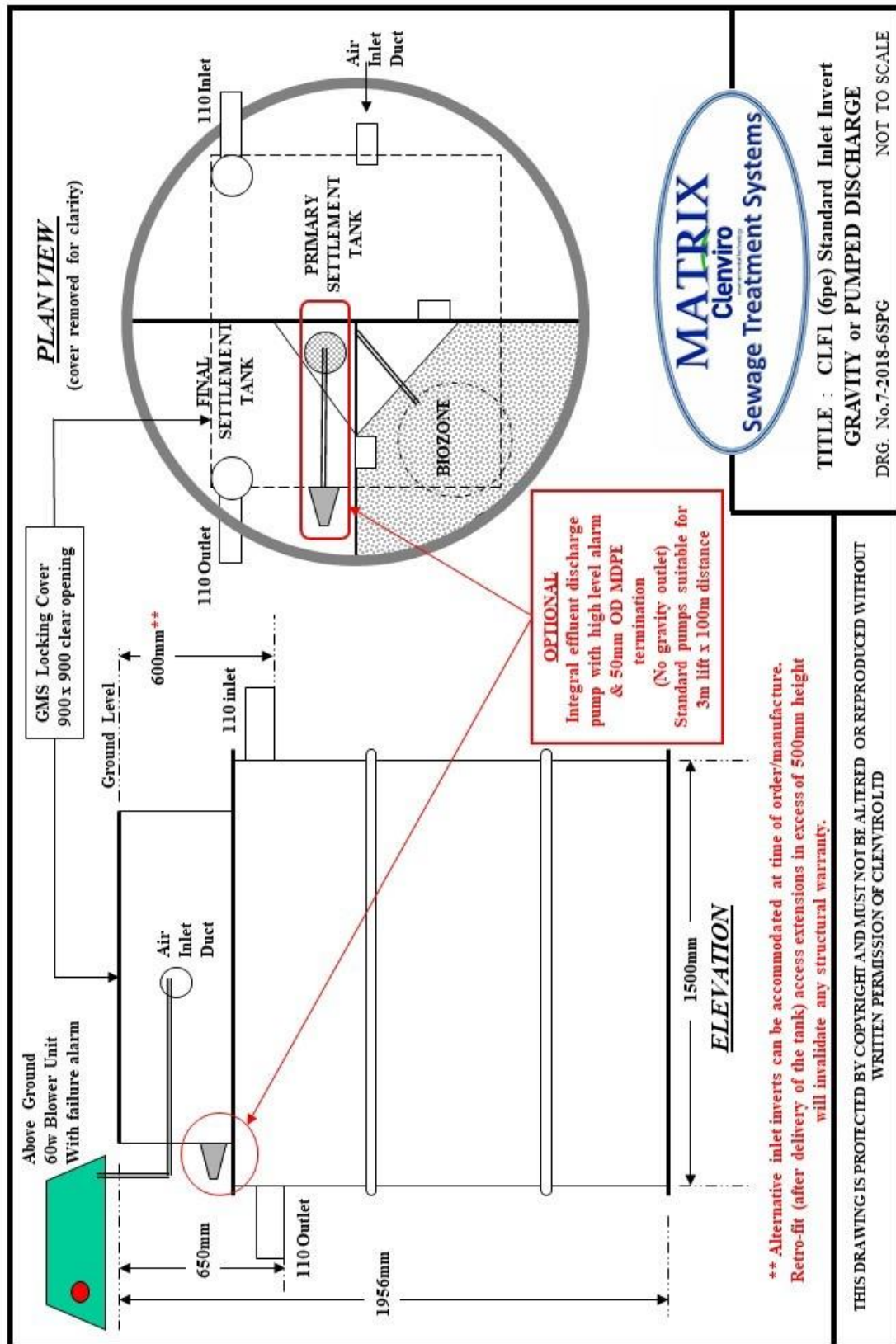
## FINAL SETTLEMENT TANK

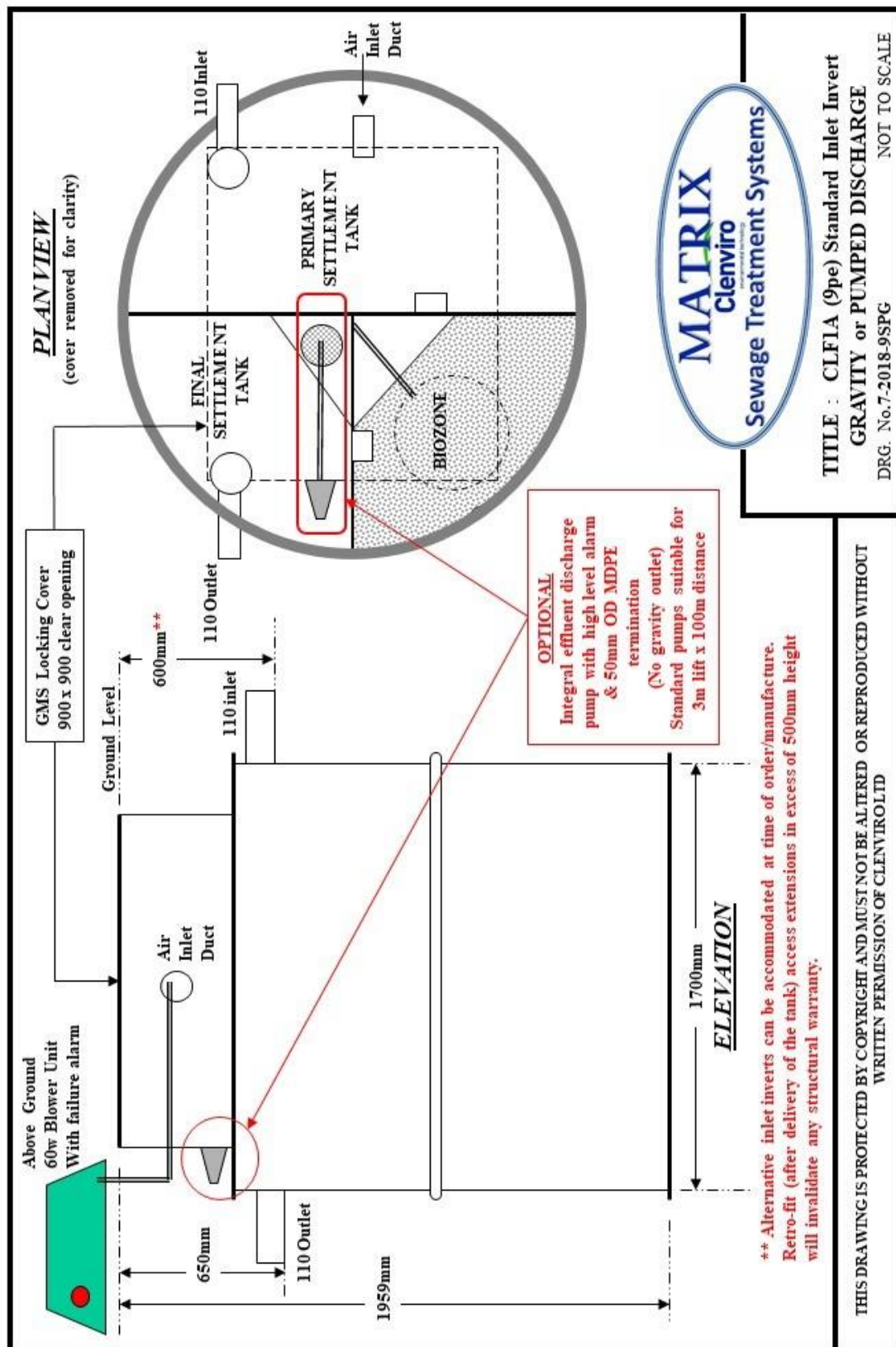
The final settlement tank is designed in accordance with the requirements of BS 6297 to ensure relevant surface areas and rise rates are achieved to provide maximum settlement of any suspended solids prior to discharge.

The “**Matrix**” system also incorporates continuous and automatically timed humus sludge return systems to return humus sludge from both the final settlement tank and each biozone, back to the primary settlement tank.

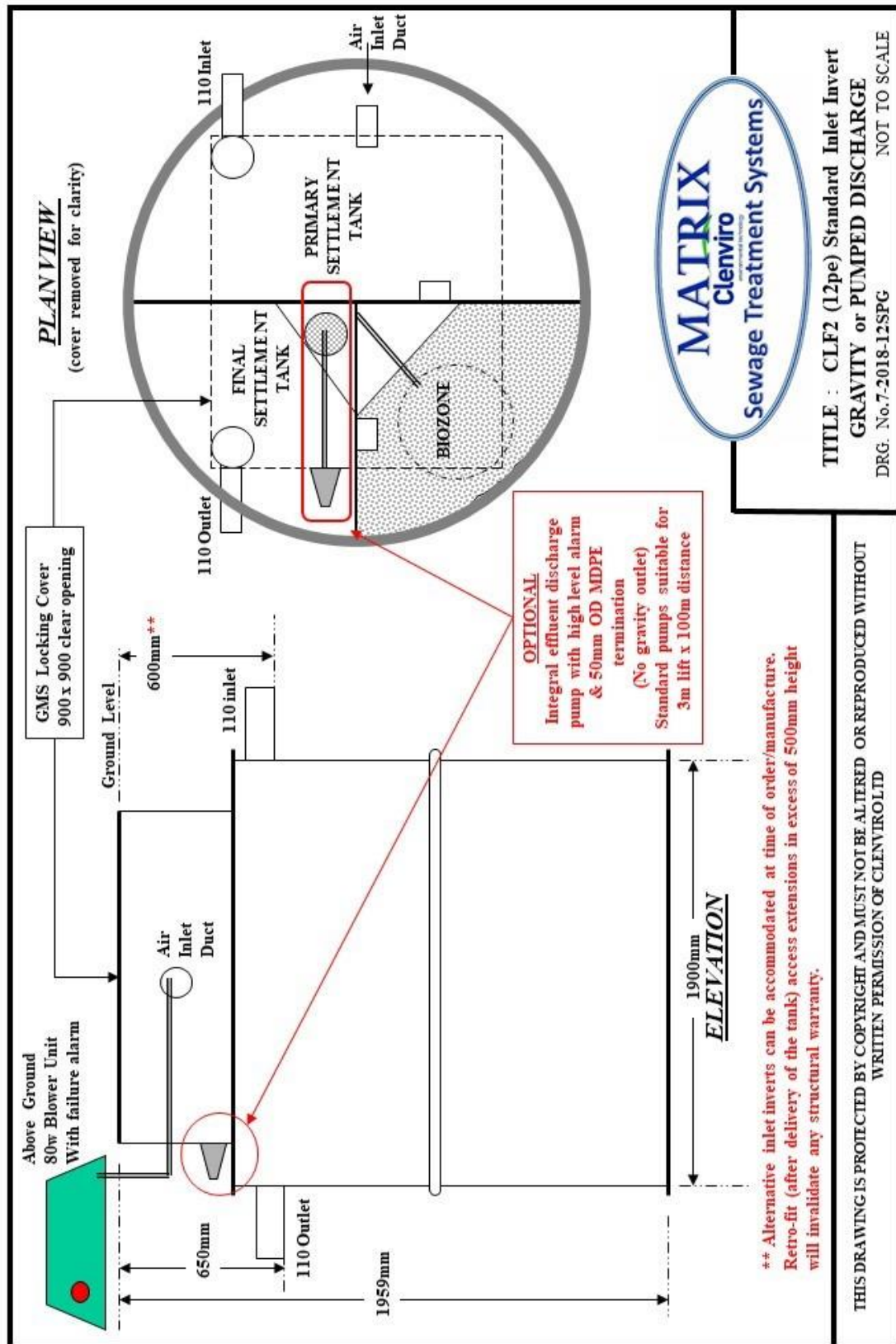
Additionally this system also provides for continuous recycling of treated effluent back to the P.S.T. to not only provide dilution of incoming settled effluent but to also ensure continuous flow during periods of low or no flow, thereby keeping the biomass in prime condition.

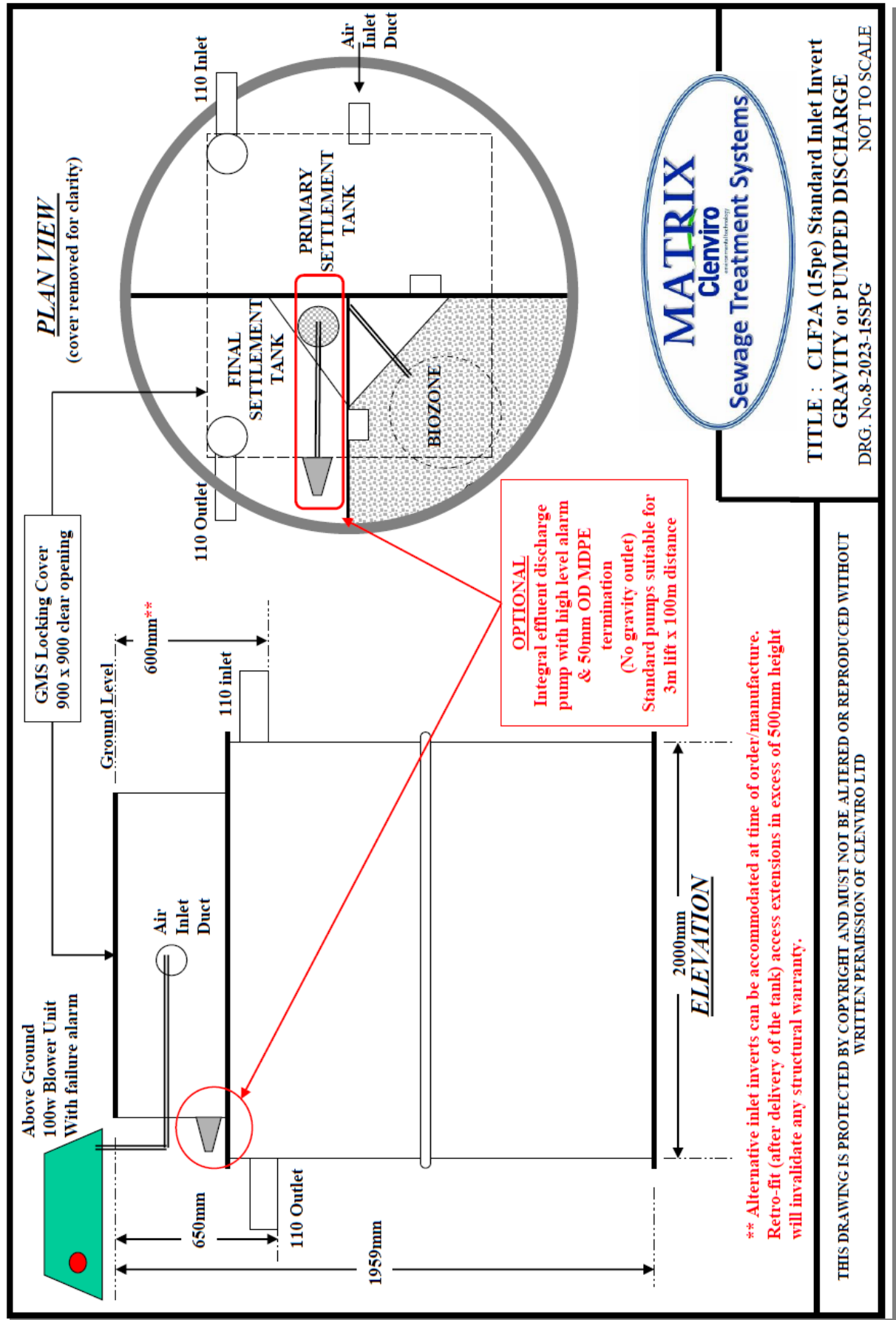
**To maximize efficiency and to minimize maintenance requirements and potential problems, there are NO mechanical or moving parts contained within the treatment plant.**

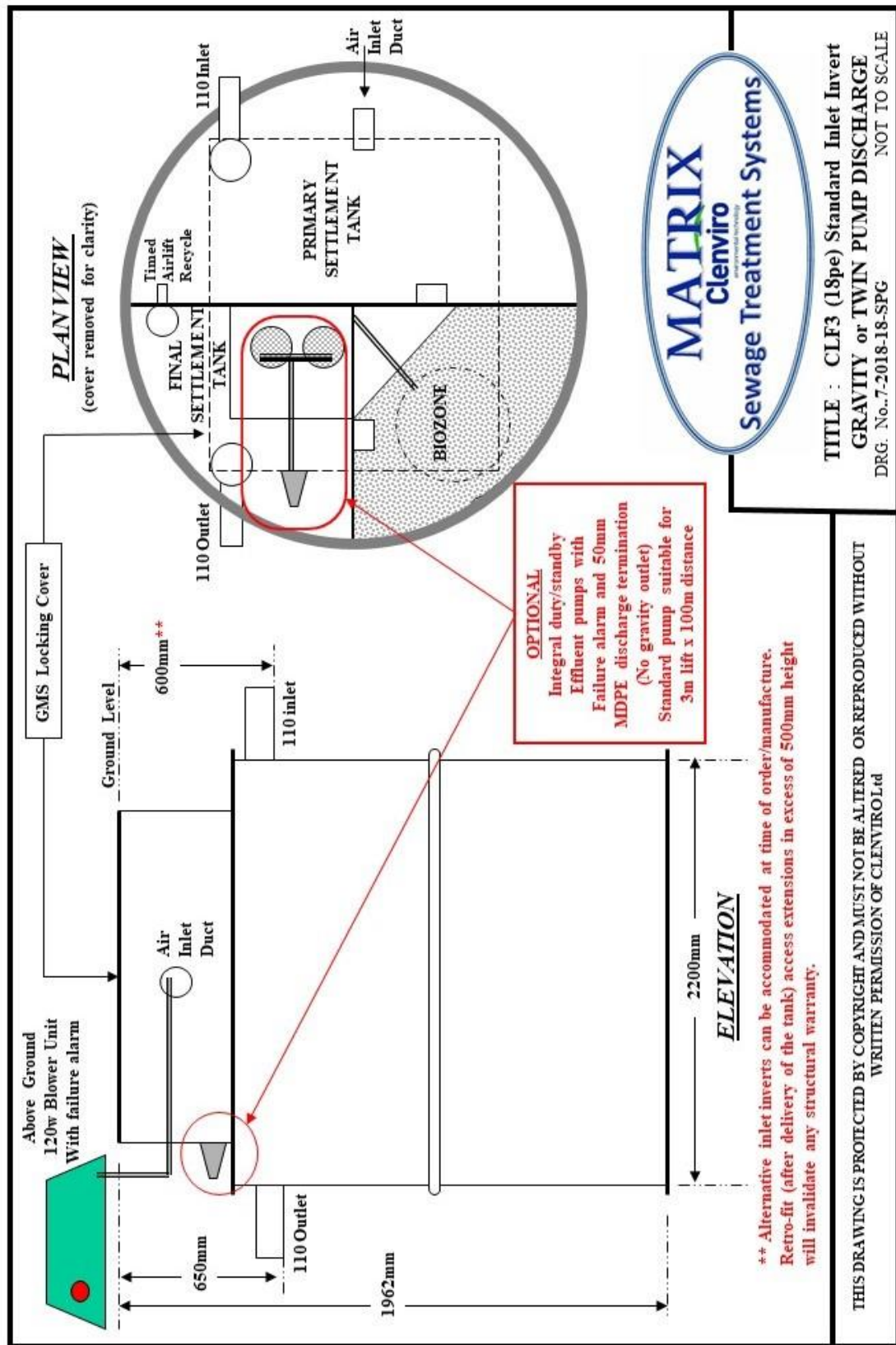


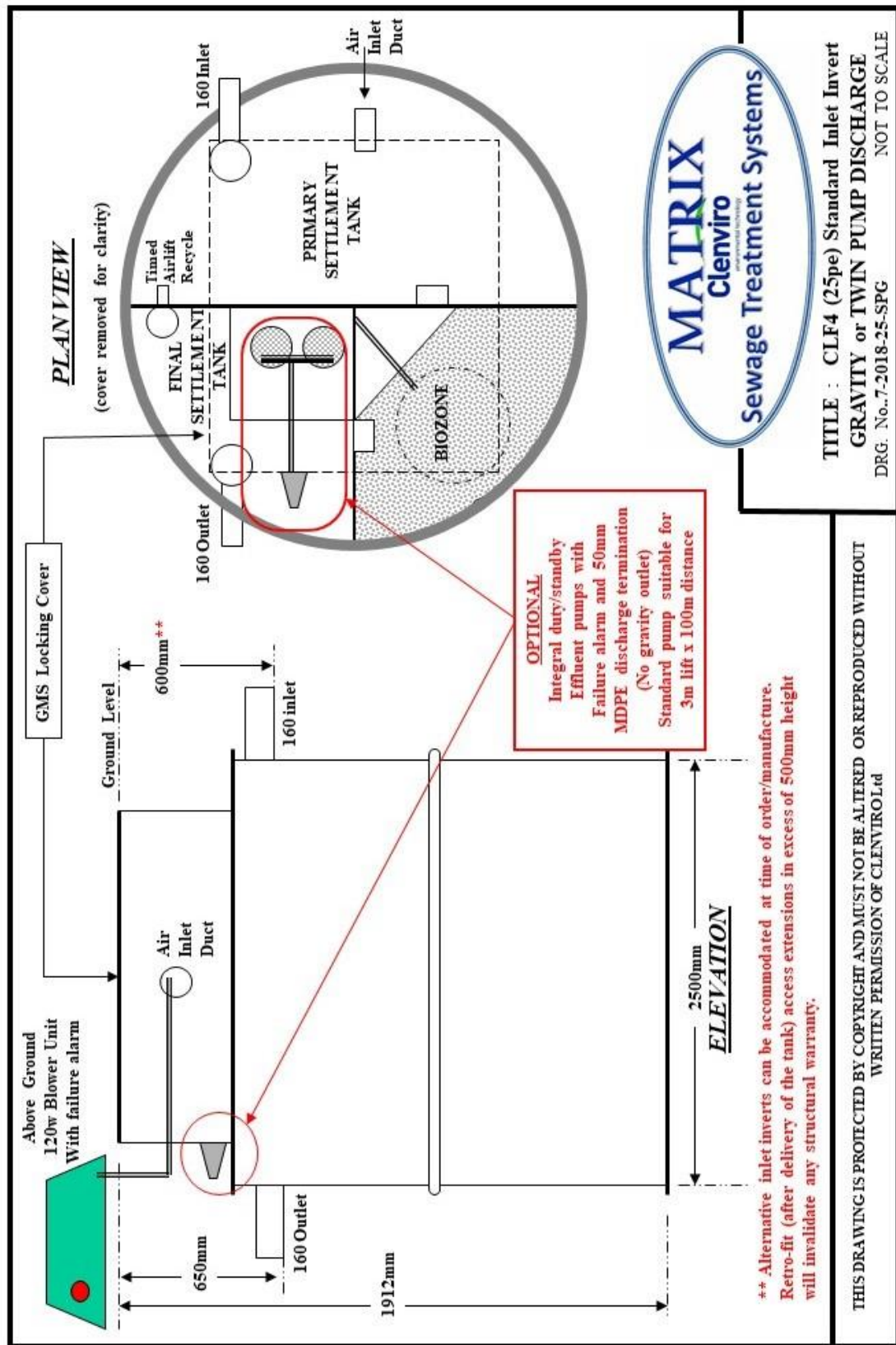




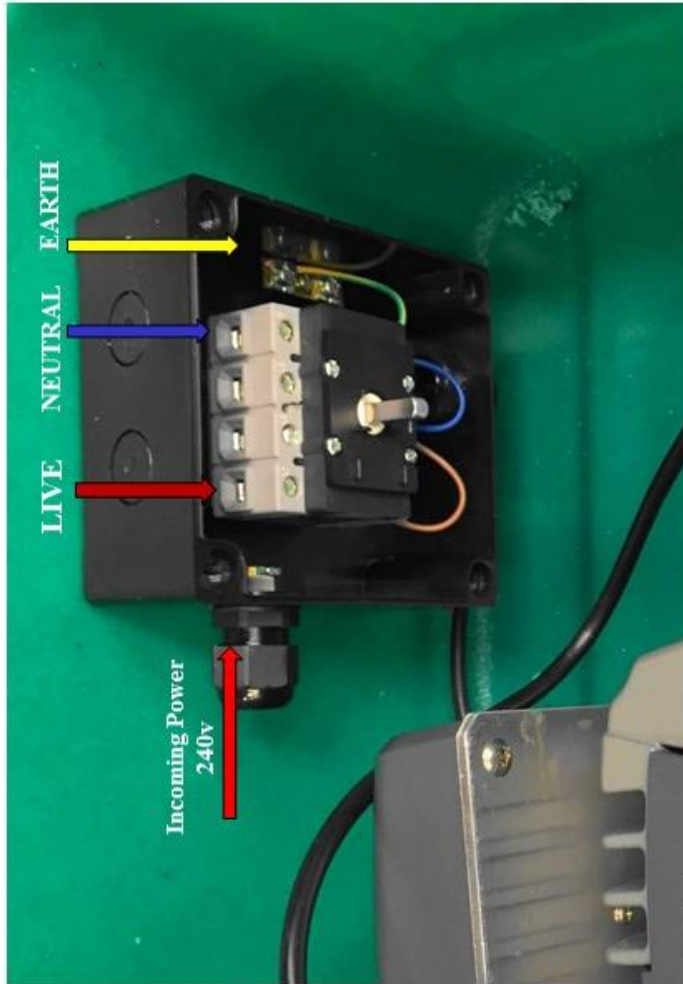












Note : Blower – Alarm & 'Power On' lamp are factory pre-wired.

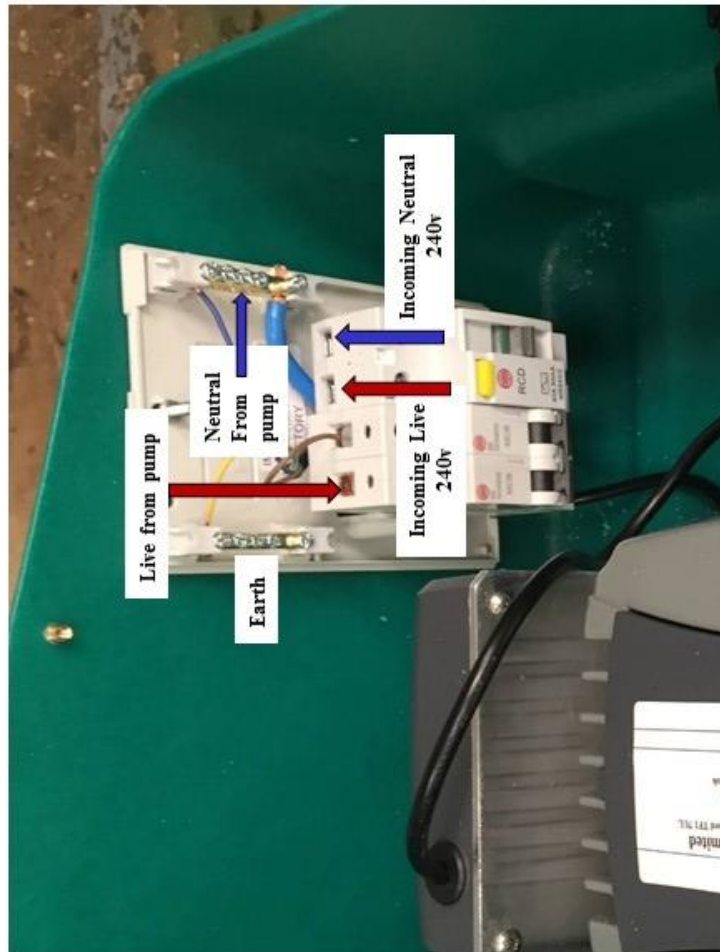


TITLE : CLF1-CLF1A - CLF2- CLF3 - CLF4  
Gravity Discharge Models  
Electric Connection

DRG. No.26815-B

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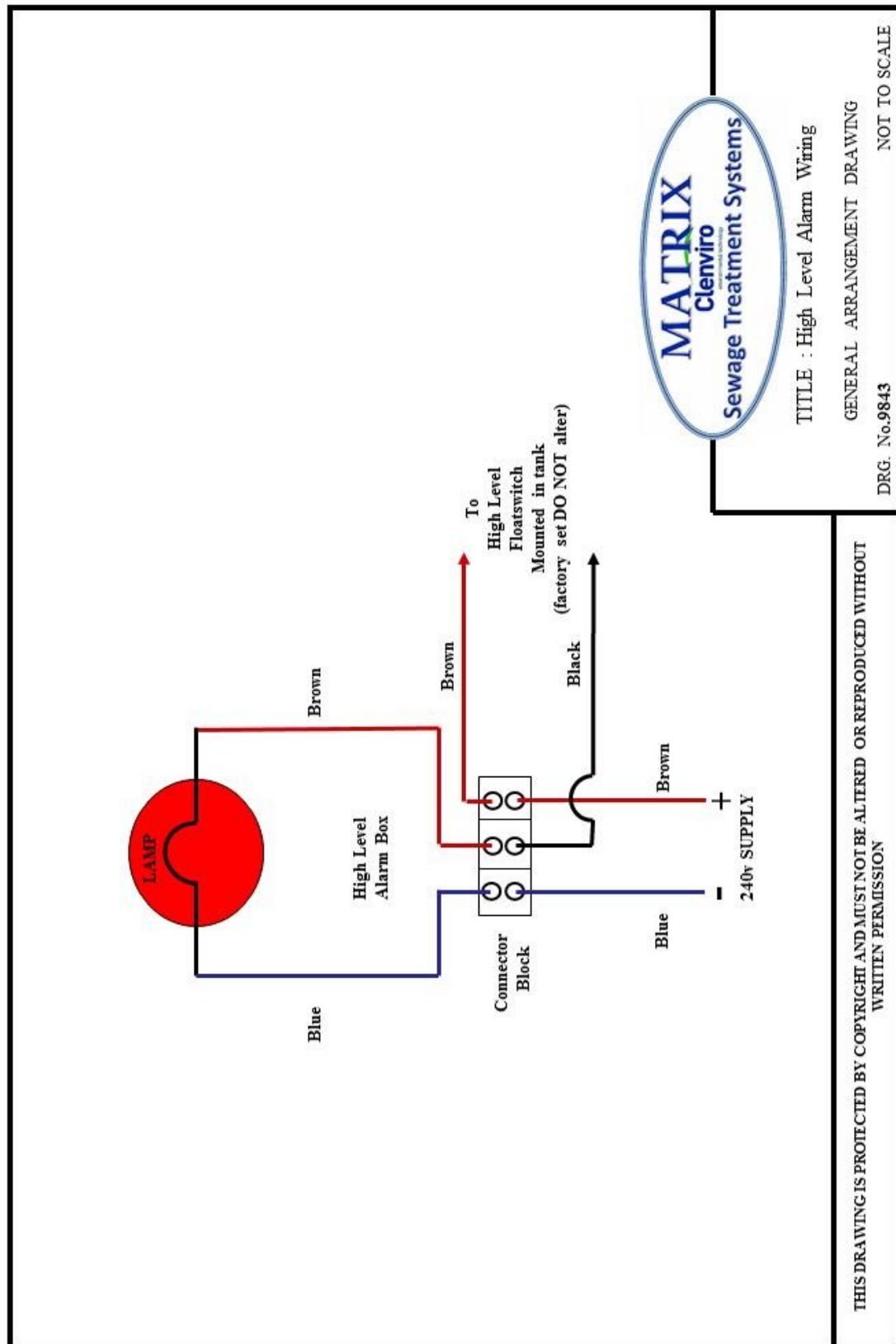
Note: Blower – Alarm & ‘Power On’ lamp are factory pre-wired

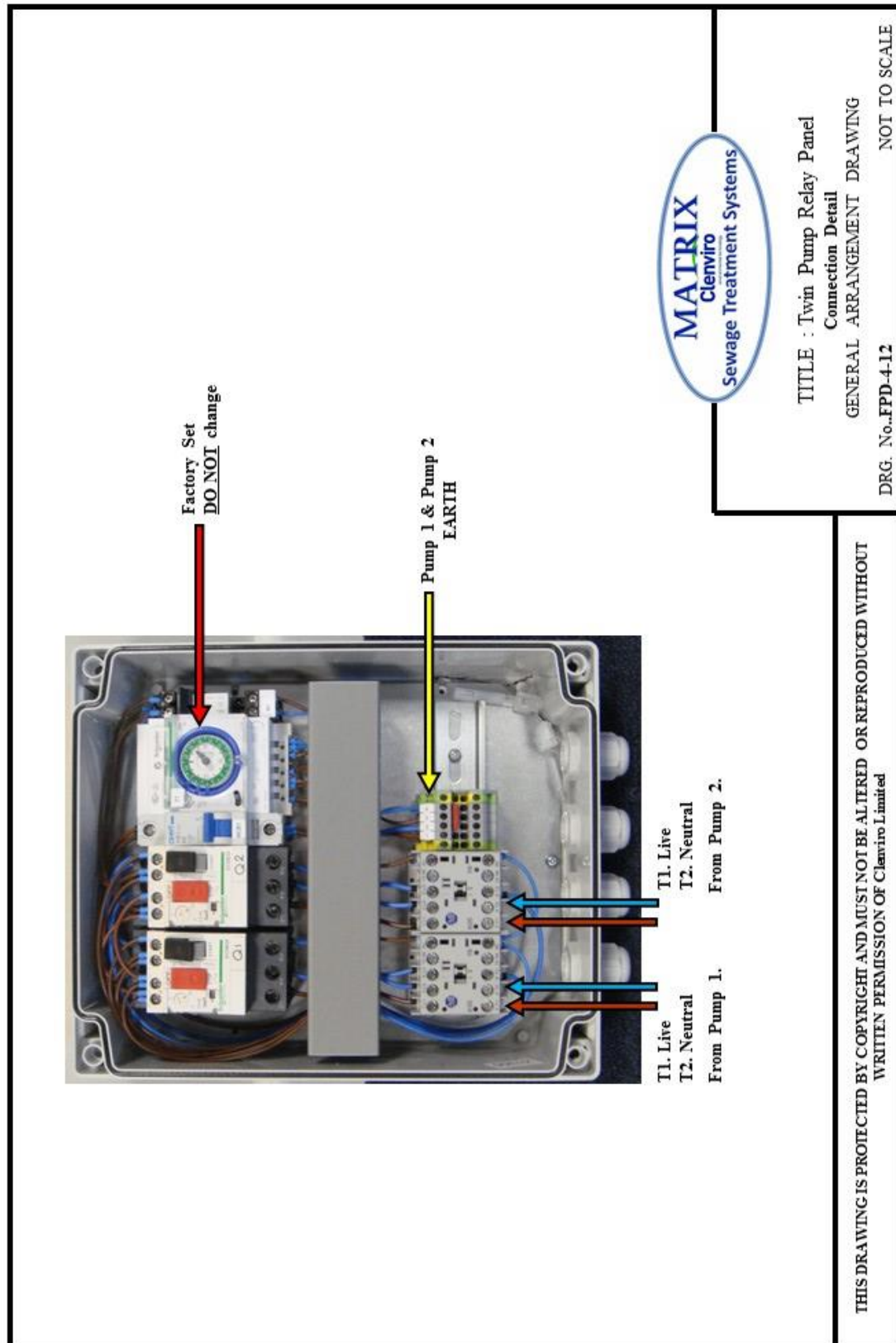
**MATRIX**  
Clenviro  
Sewage Treatment Systems

TITLE : CLF1-CLF1A - CLF2  
Pumped Discharge Models  
Electric Connection

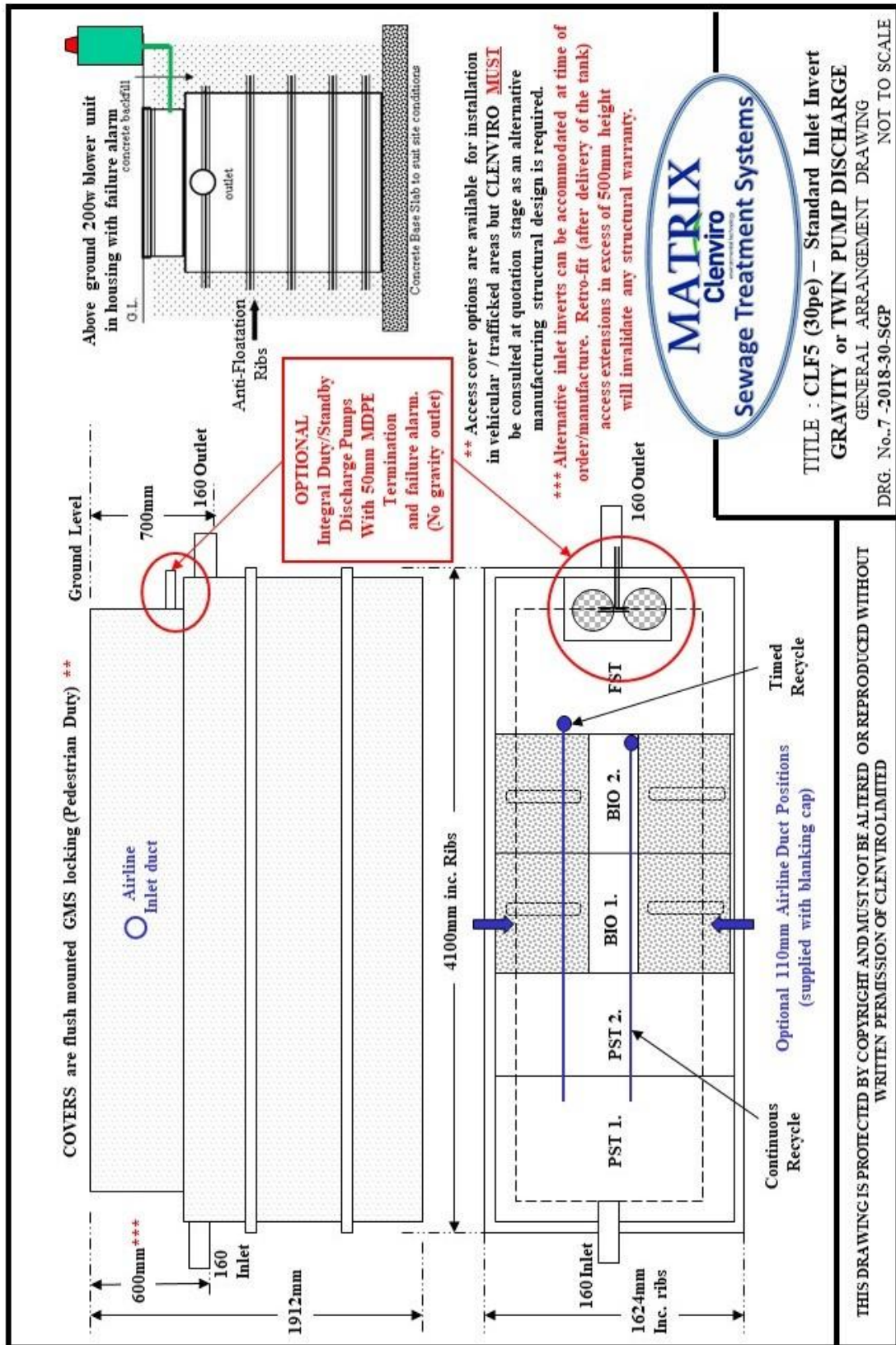
DRG. No.26815-A NOT TO SCALE

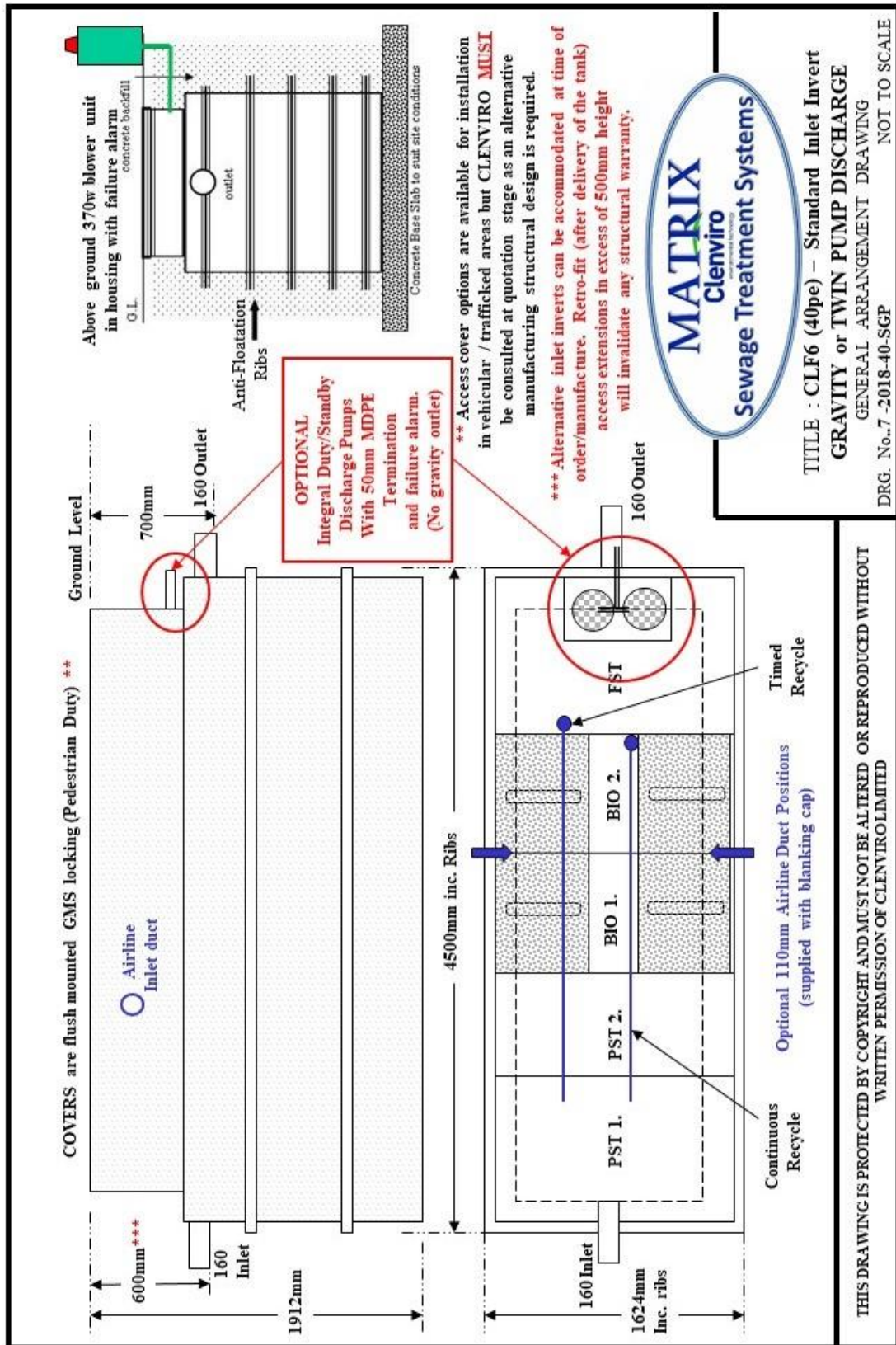
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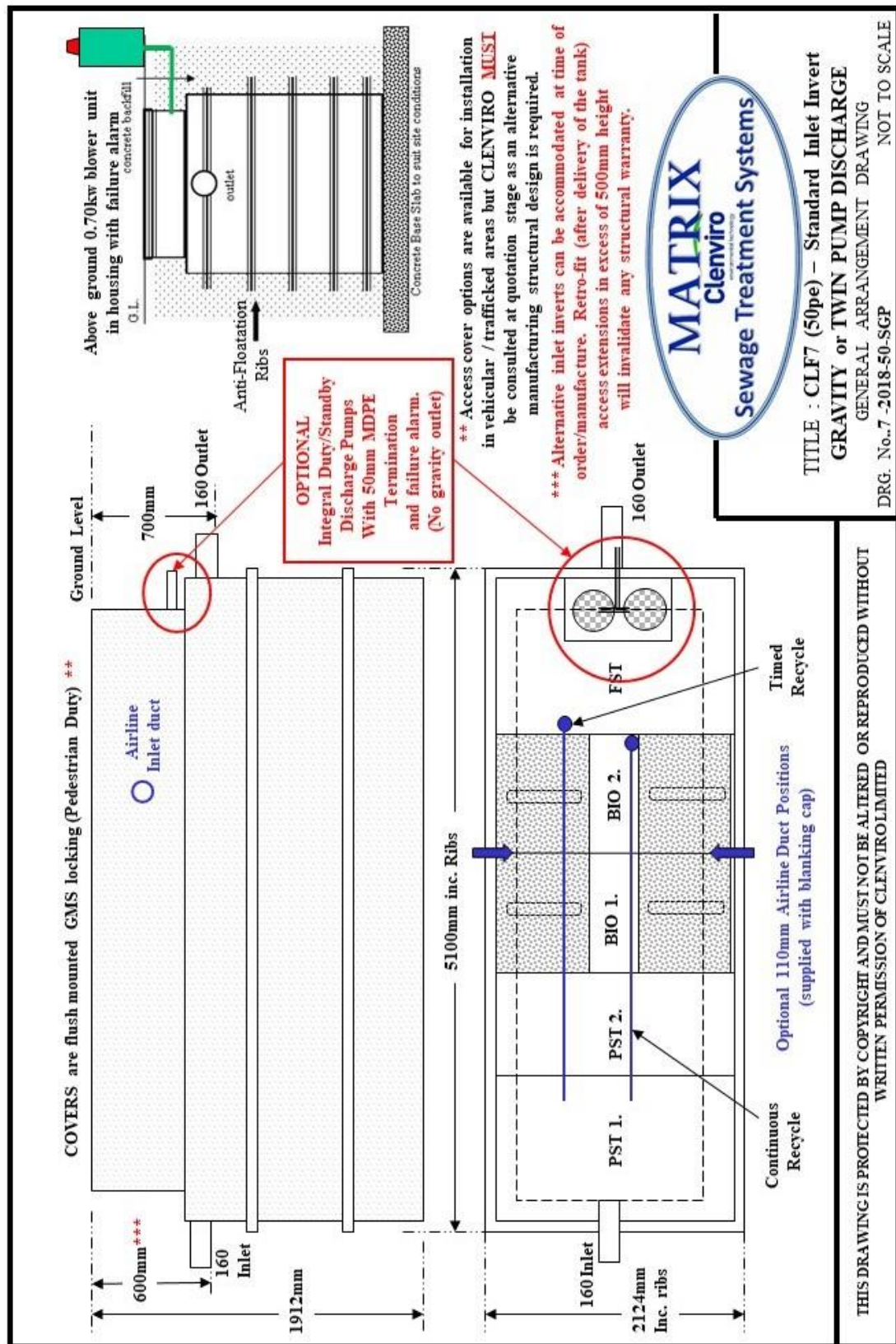


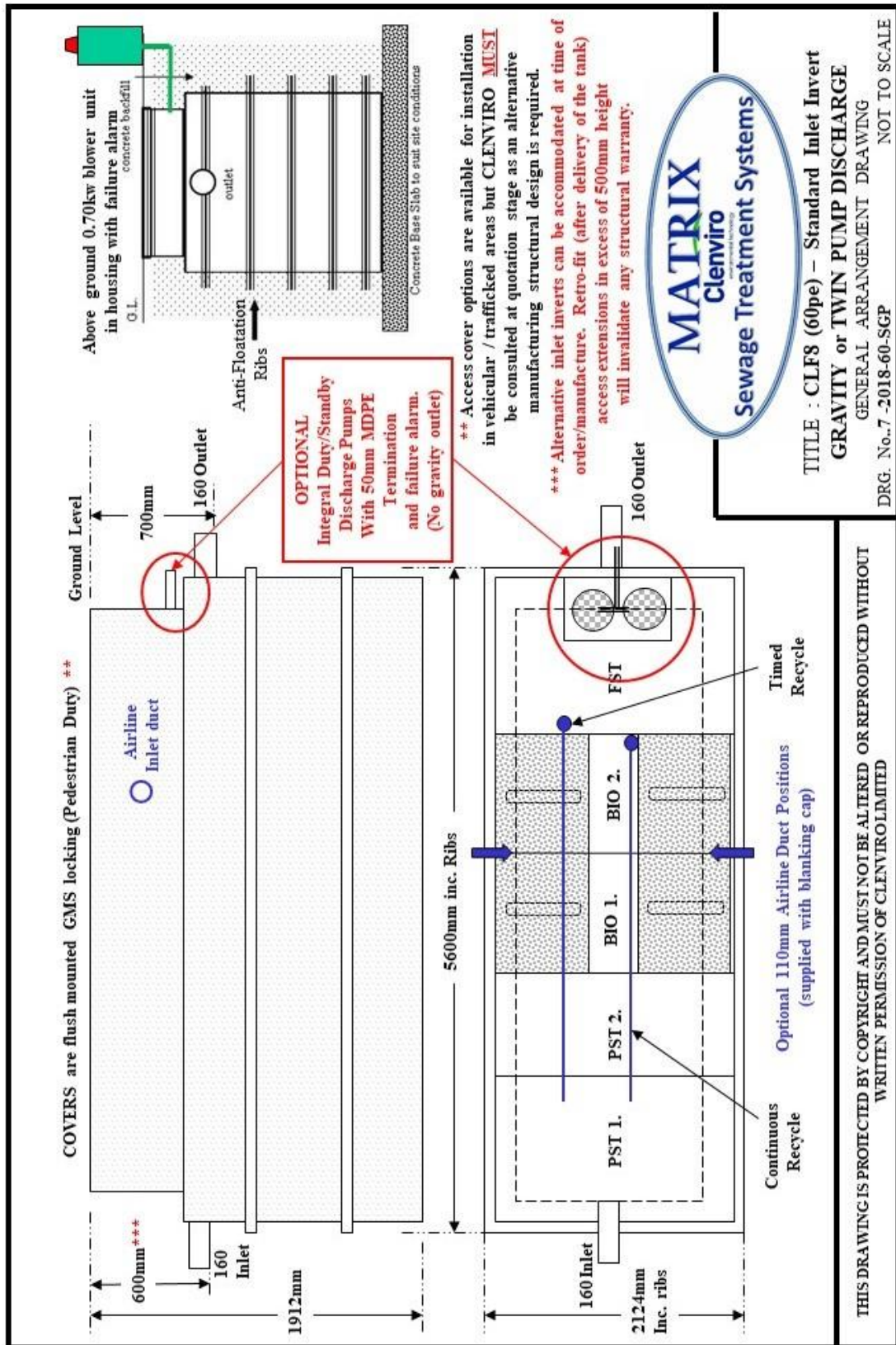




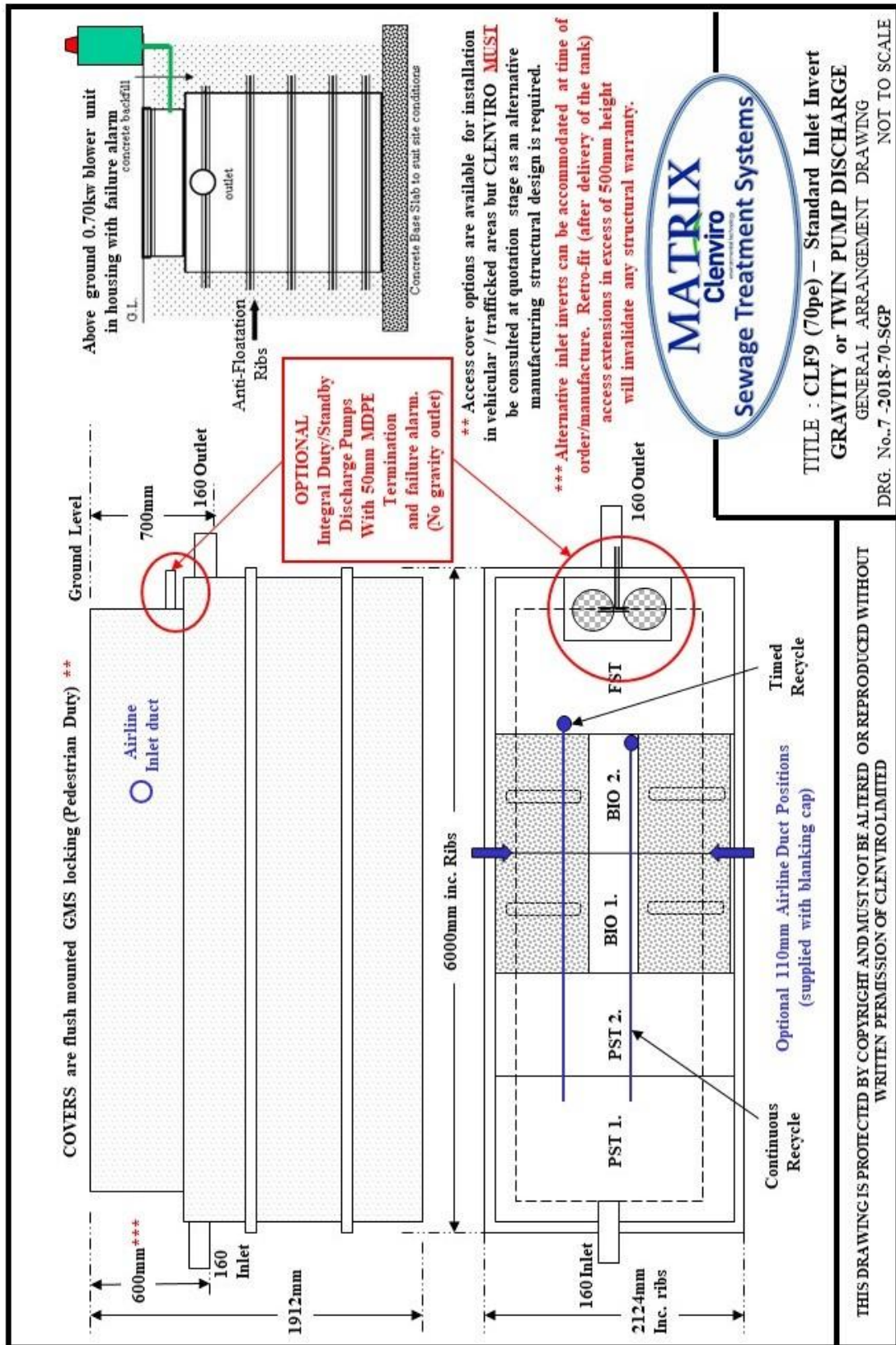


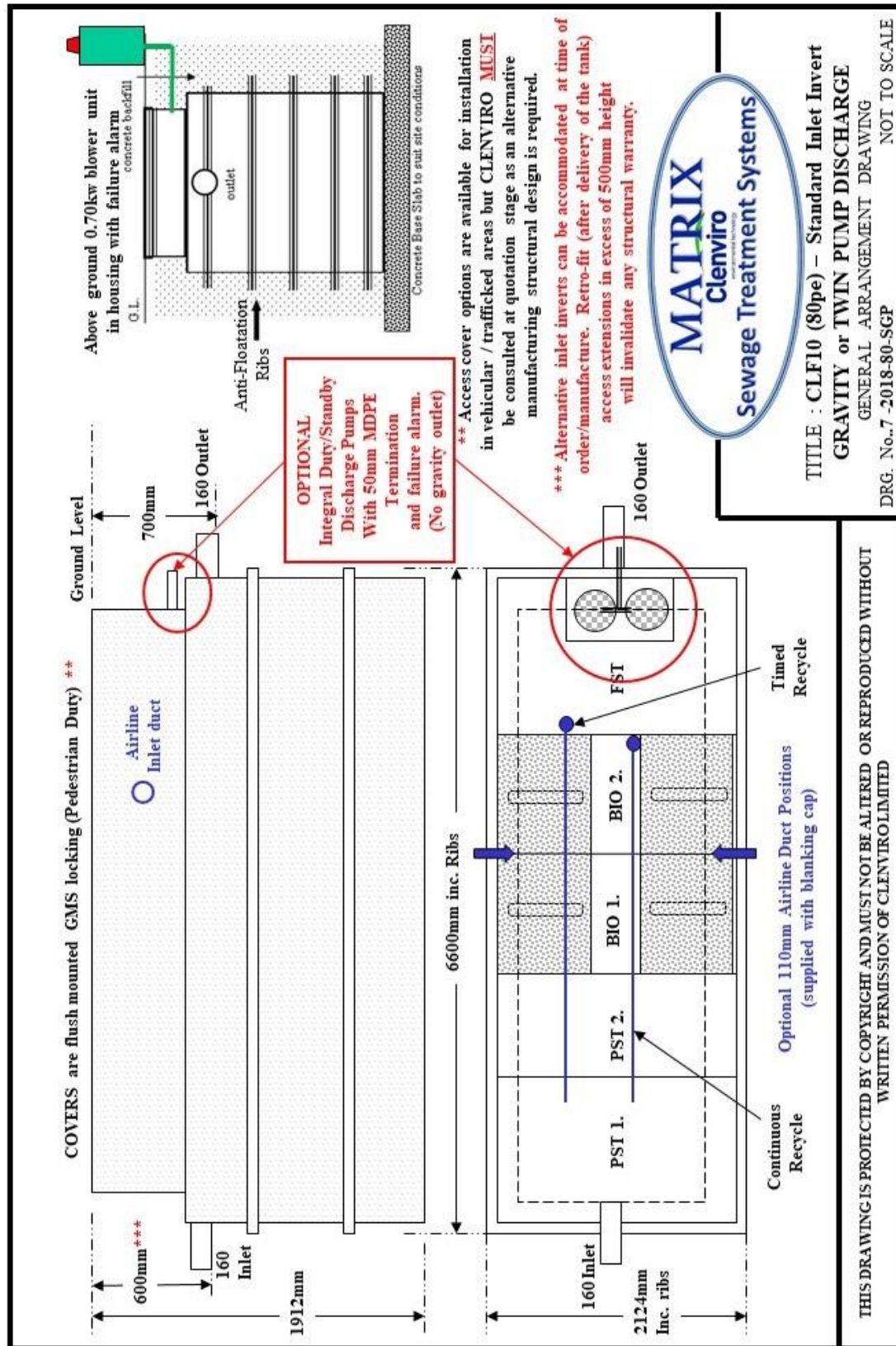






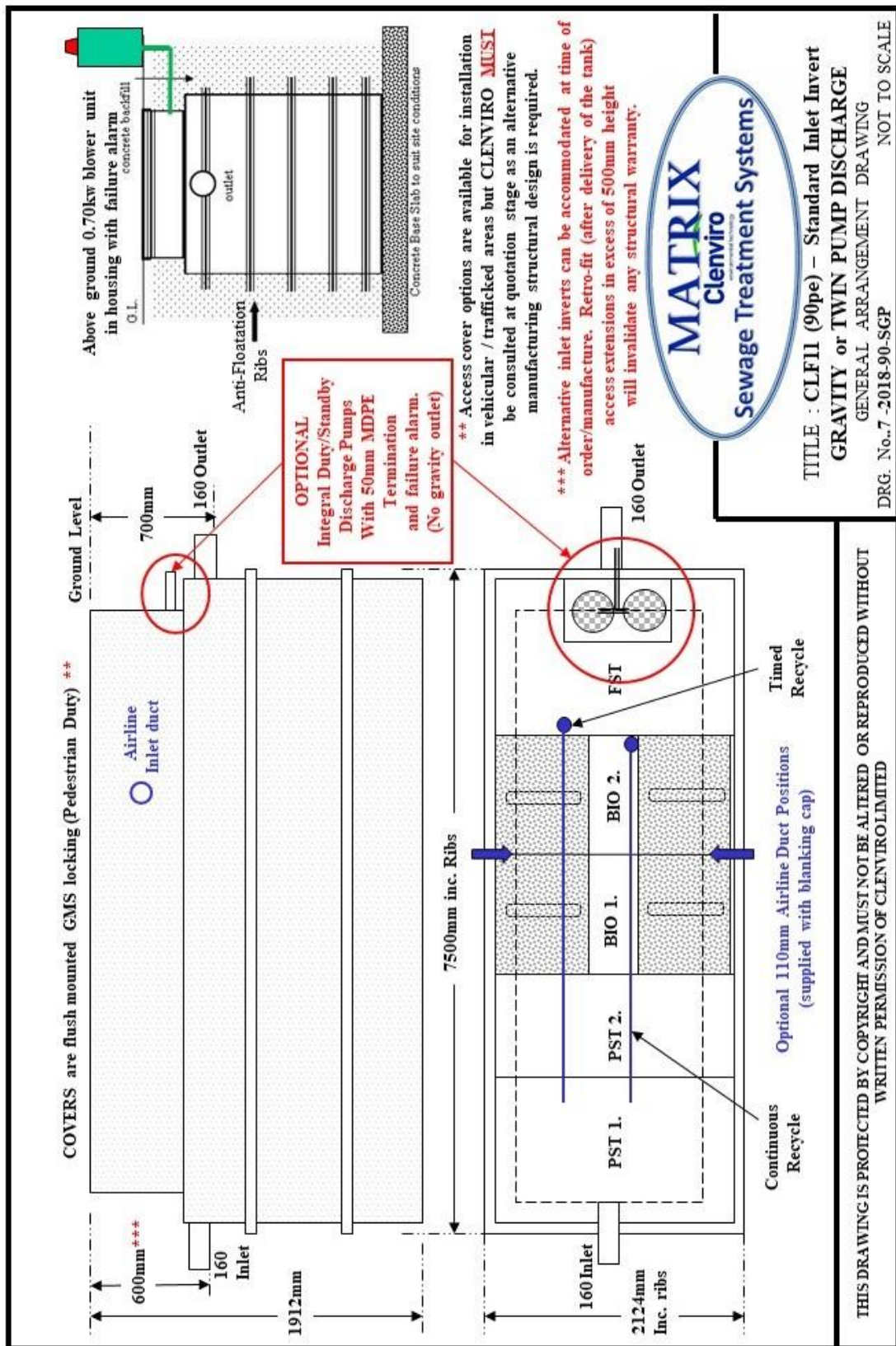


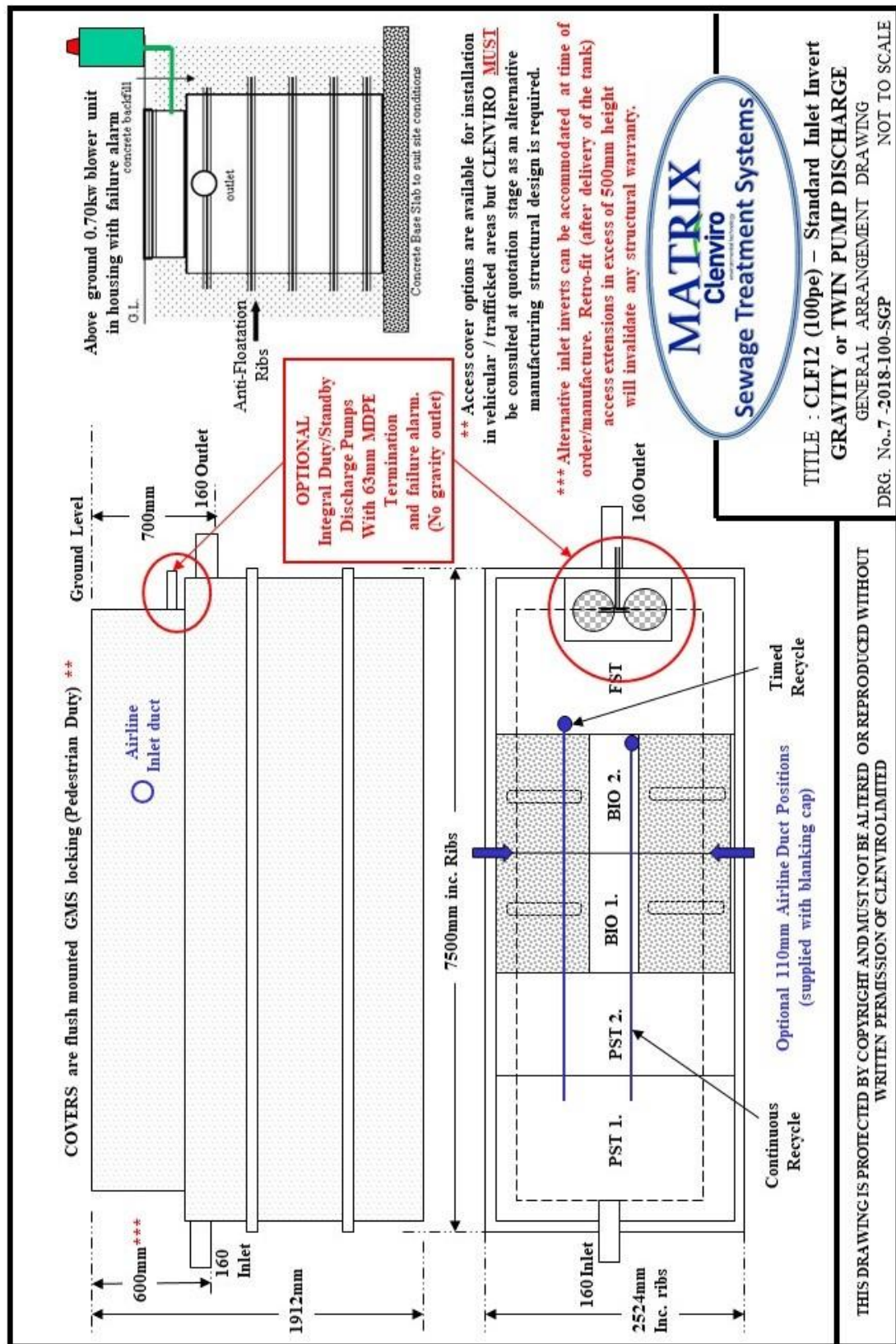




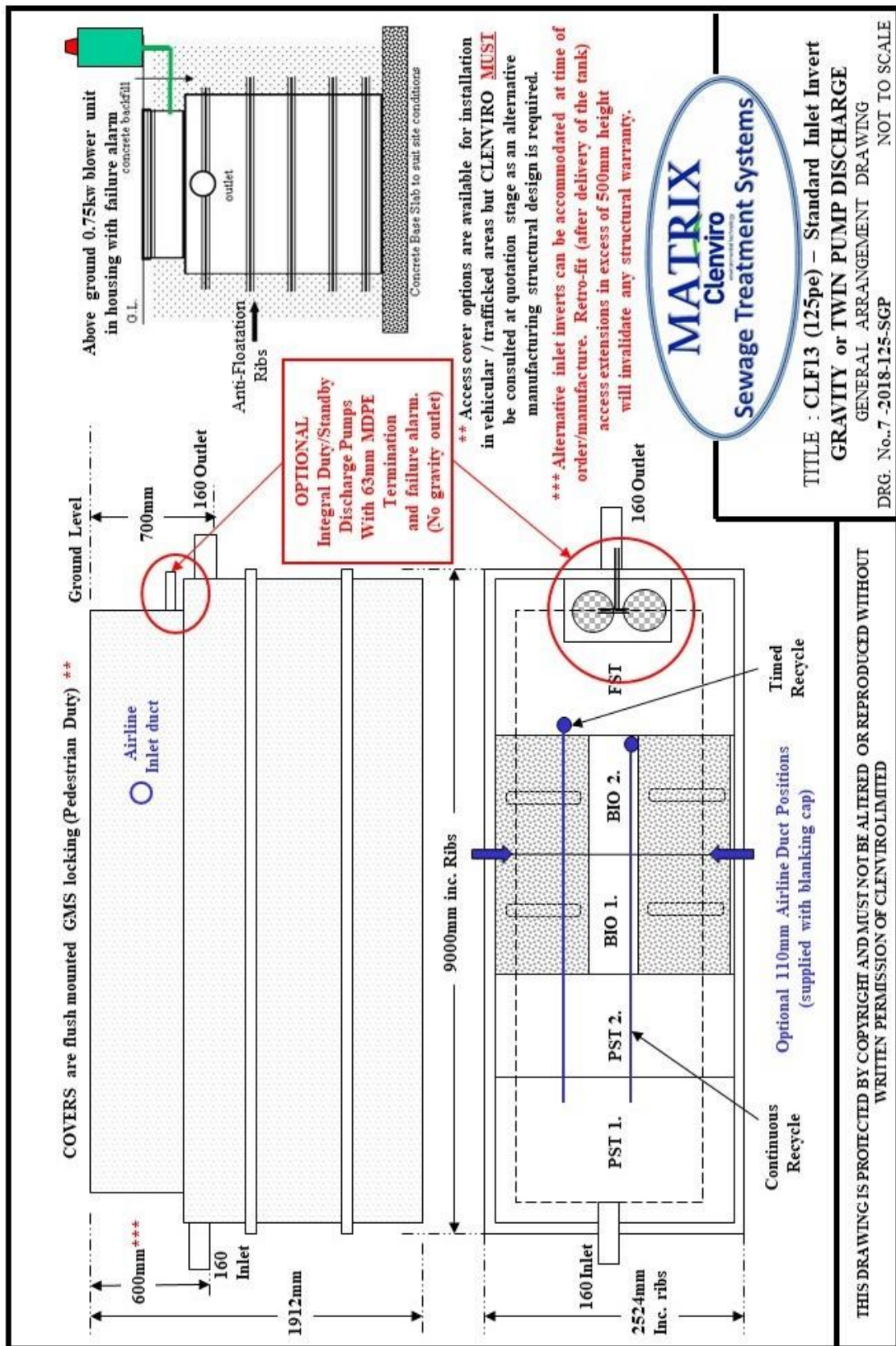
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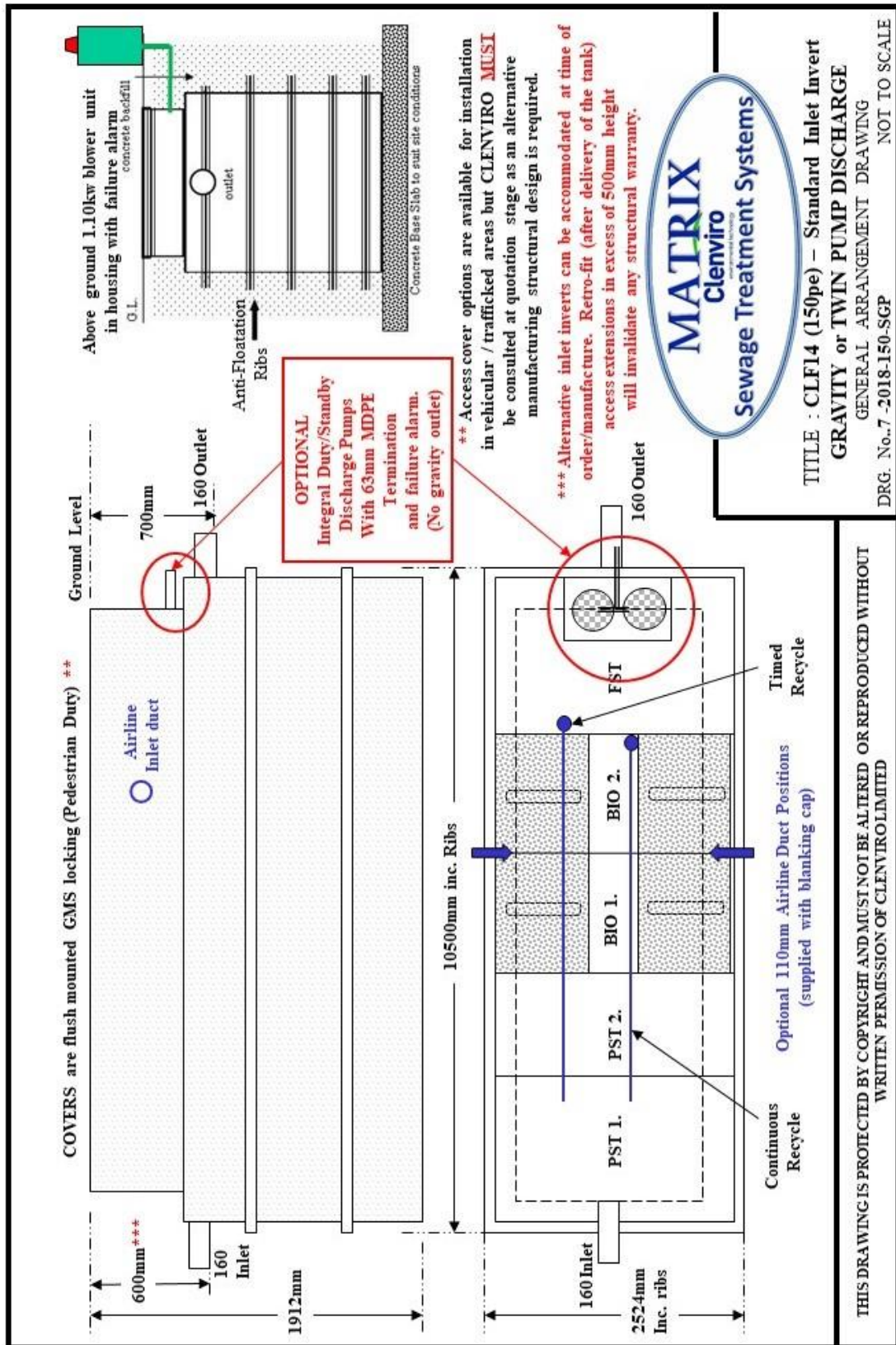




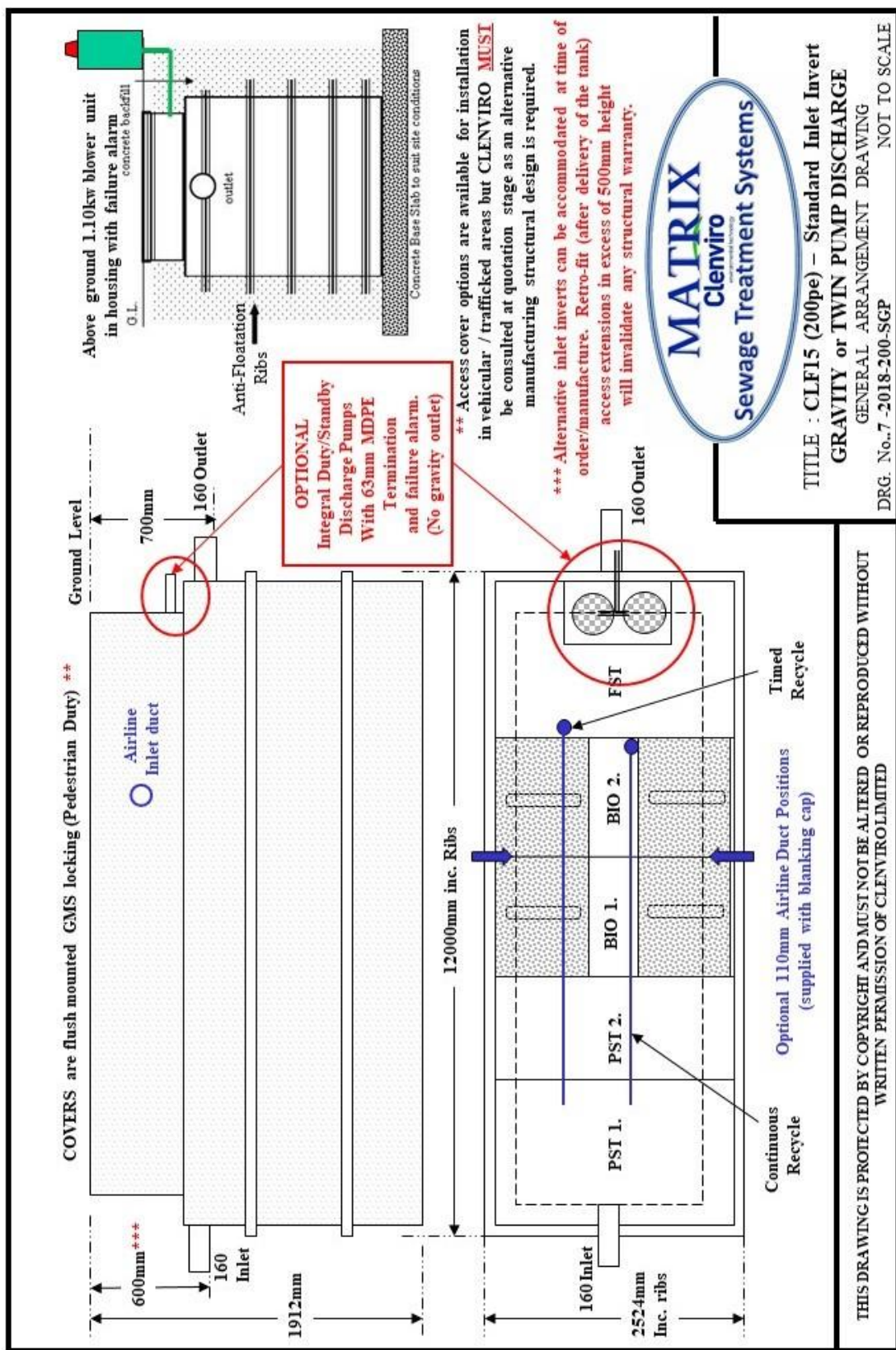




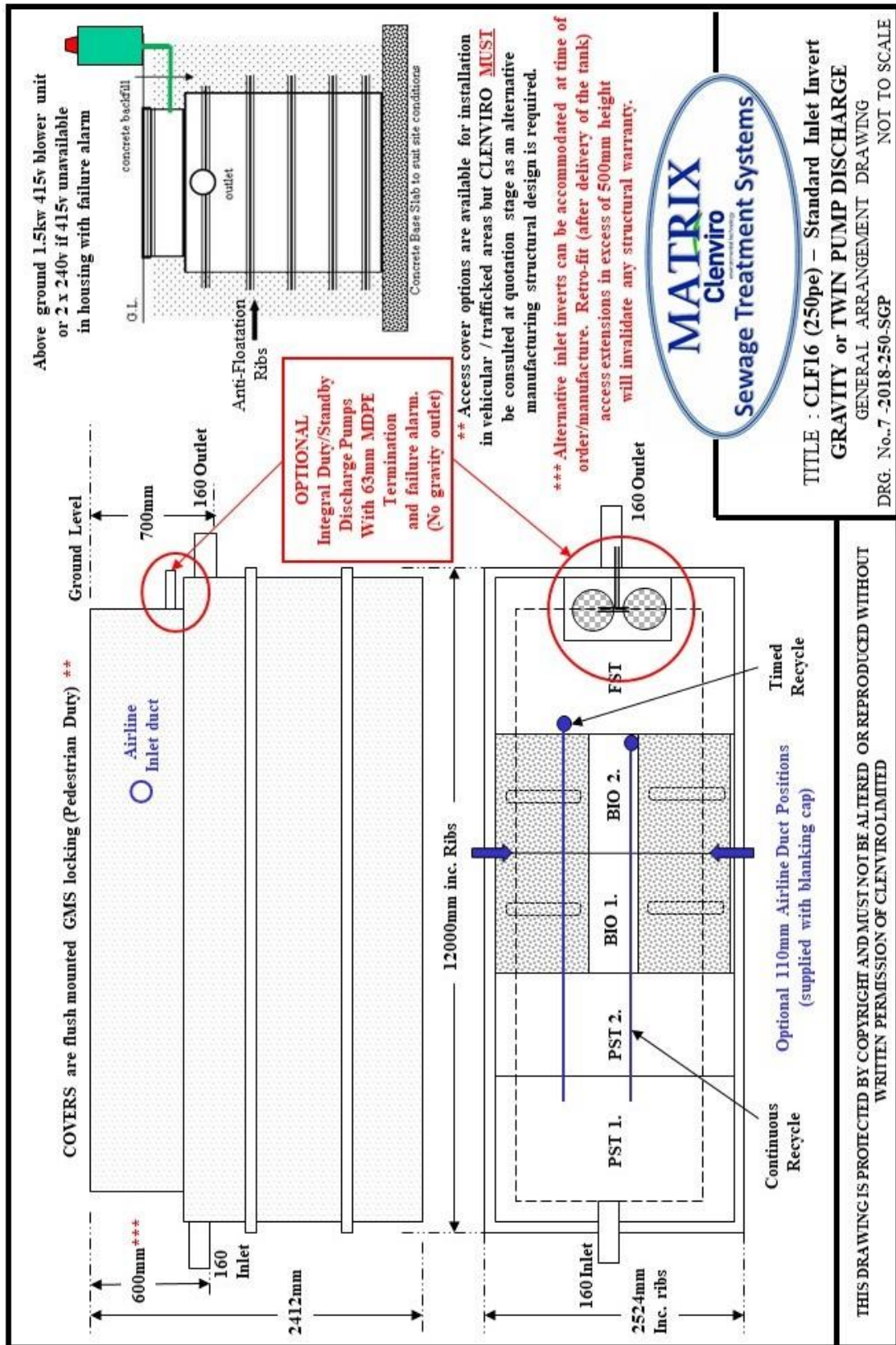


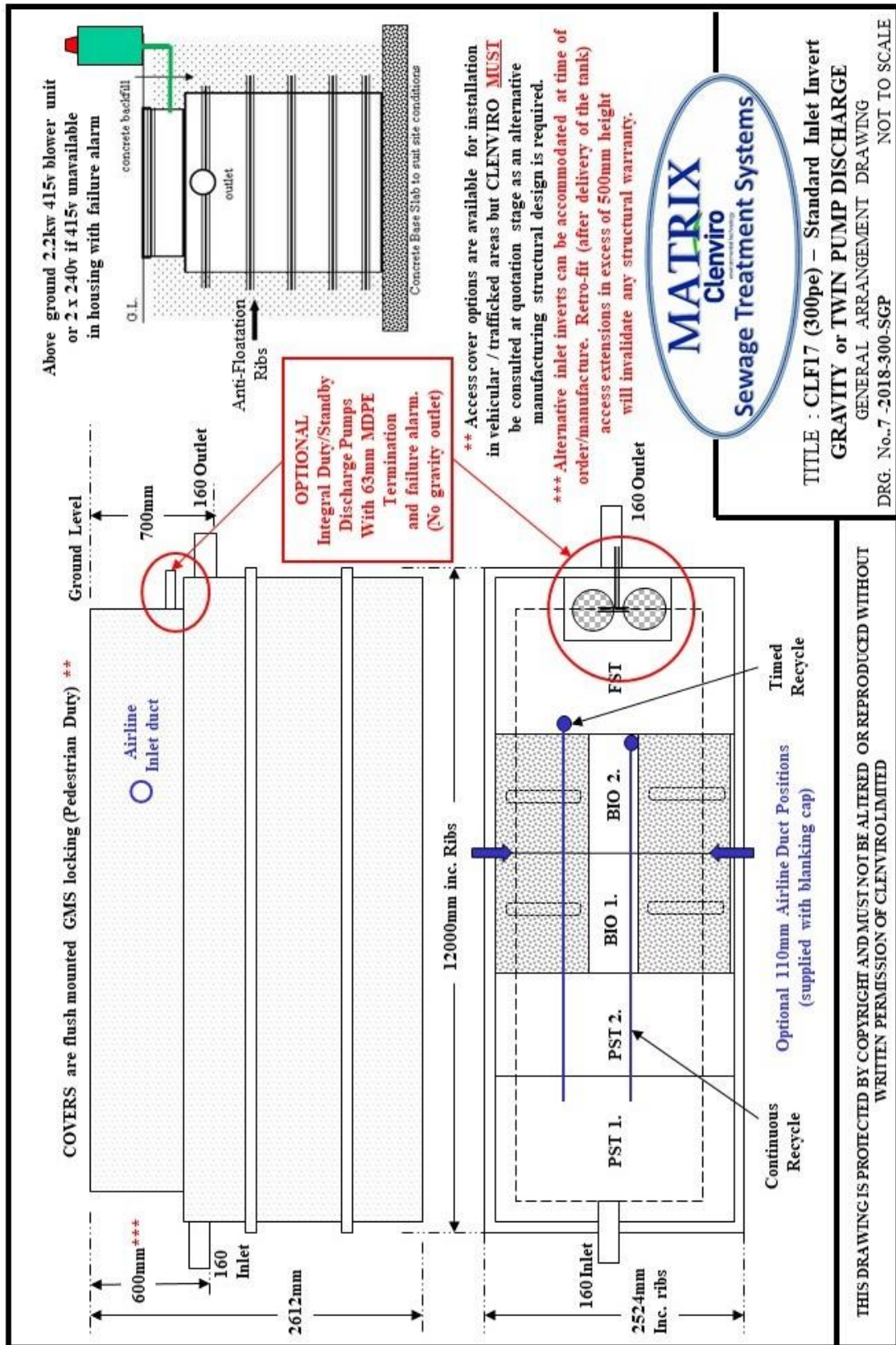




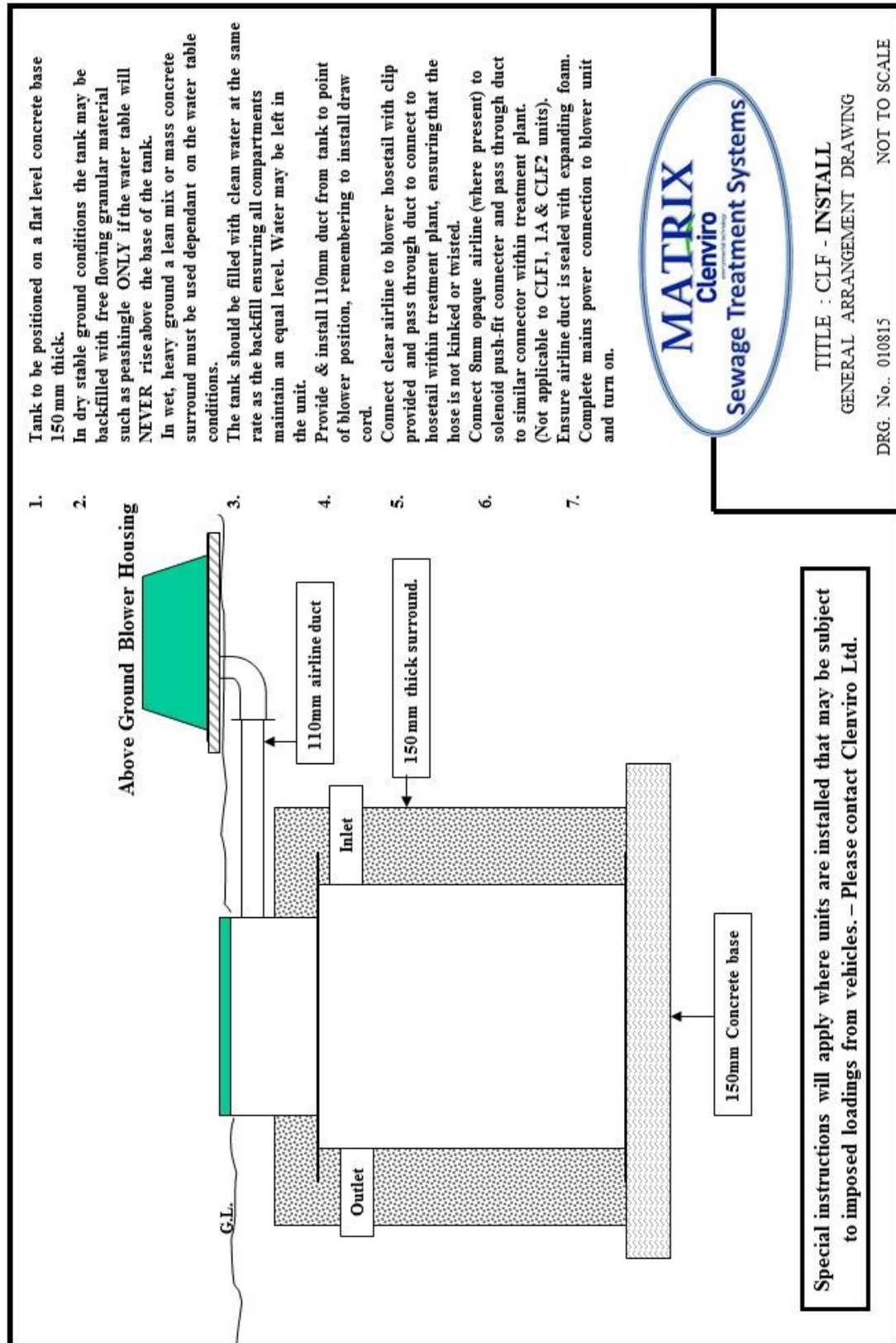






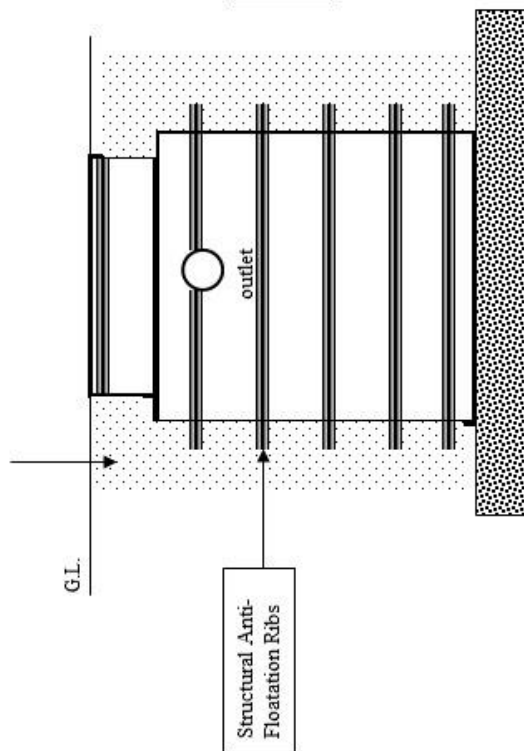


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Concrete backfill to a minimum thickness of 150mm around tank.



Excavate hole to allow for 150mm bedding and surround.  
(see relevant drawing for tank dimensions)

Position tank on a flat level concrete base to suit tank size and prevailing ground conditions ensuring it is level in all planes

When backfilling tank ensure all internal chambers are filled with water to keep pace with the level of backfill.

Never let the level difference between the backfill and the water in the unit exceed 200mm.

In high water table conditions or trafficked areas please contact Clenviro Ltd for specific advice

**NOTE** : Standard inlet invert is 600mm - shaft extensions can be provided for deeper inlet depths.

Inlet and outlet orientations can be changed to suit site requirements

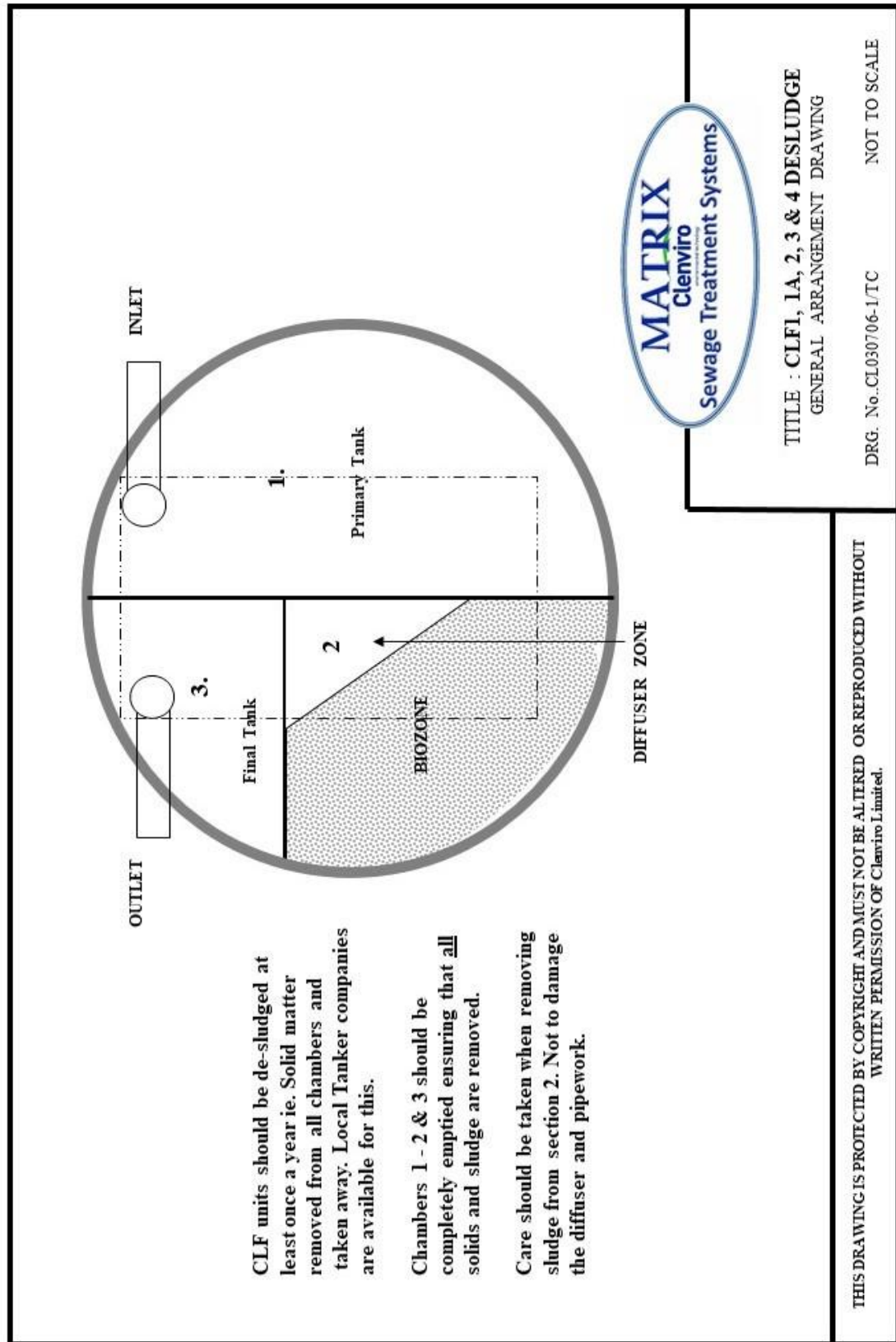
Integral sample and effluent pumping arrangements available on request

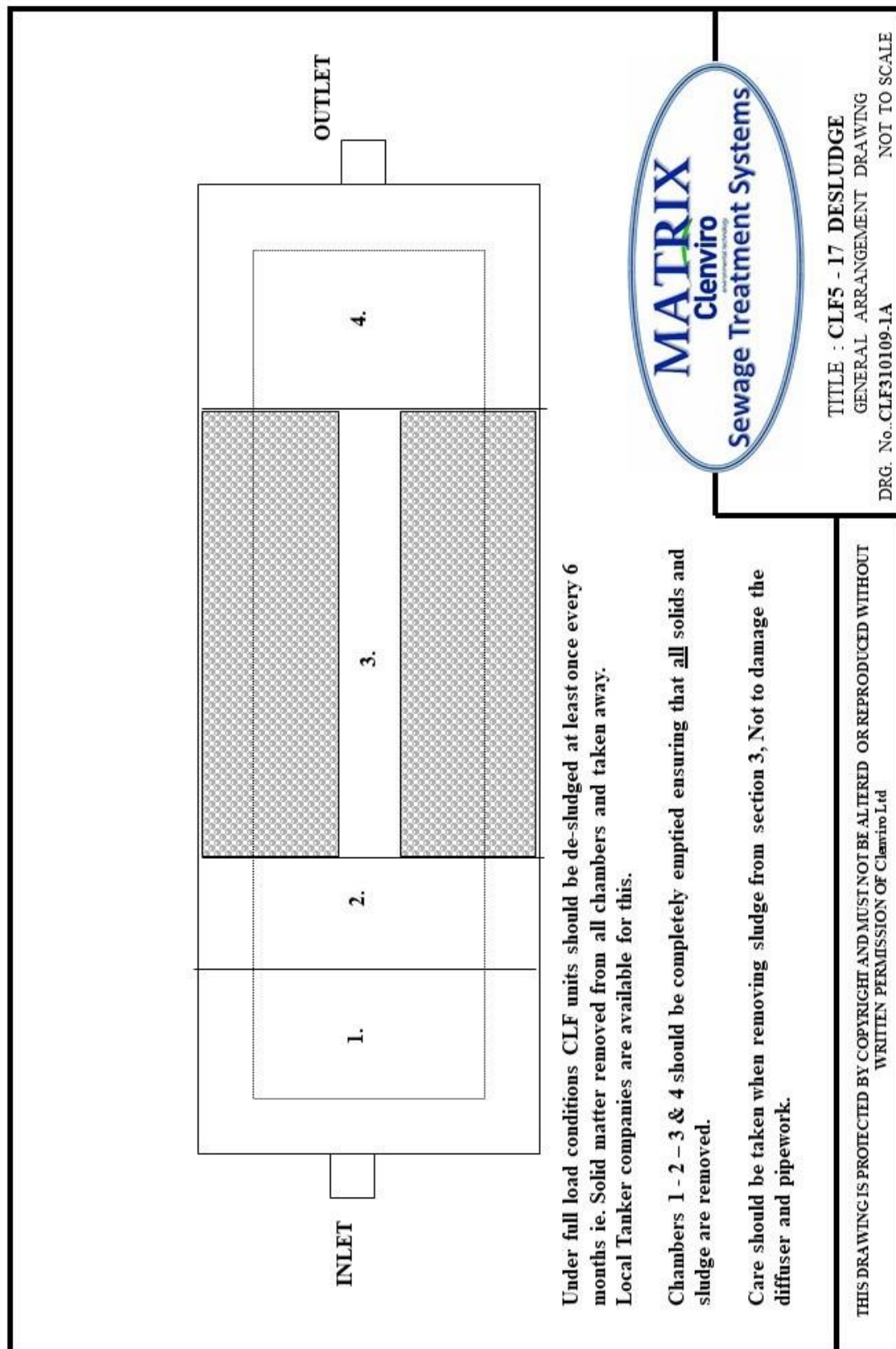


*This drawing should be read in conjunction with the Operation & Maintenance manual.*

**Sewage Treatment Plant Installation**  
GENERAL ARRANGEMENT DRAWING

DRG. No.STPINSTALL NOT TO SCALE





<b>CE</b>	
<b>Clenviro Limited</b> <b>Unit 1C Queensway Business Park</b> <b>Telford</b> <b>Shropshire</b> <b>TF1 7UL</b>  <b>09</b>	
<b>EN 12566 - 3</b>	
<b>Matric CLF Sewage Treatment Plant</b>	
Hydraulic Daily Load	1.2 – 10m <sup>3</sup> /day
Material of Construction	Polypropylene
Watertightness (Water Test)	Pass
Crushing Resistance (dry ground)	Pass
Crushing Resistance (wet ground)	Pass
Treatment Efficiency	COD : 91.4% BOD : 96.2% SS : 95.5% NH-4N : 83.3%
Electrical Consumption	1.4Kwh/d

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