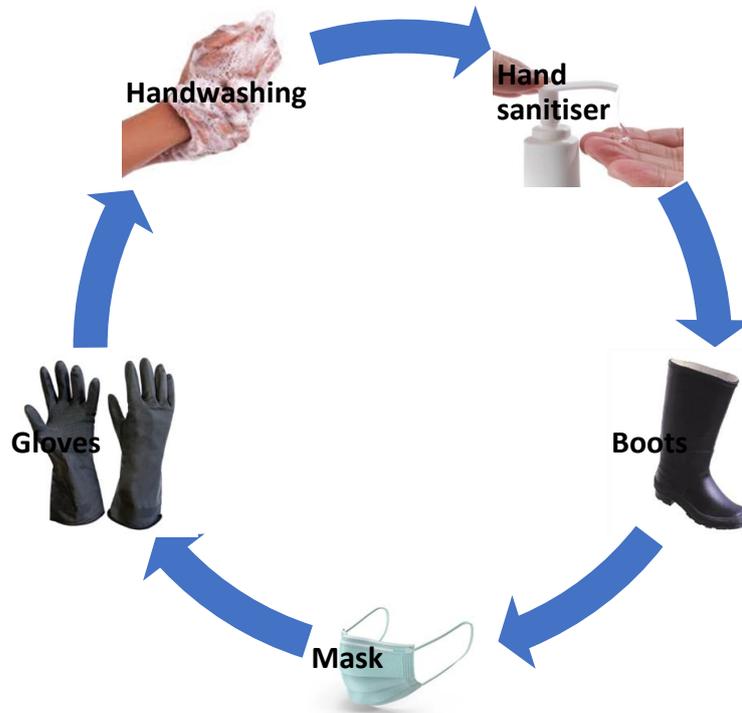


## OF 10 KLD FECAL SLUDGE TREATMENT PLANT AT KALPETTA, WAYANAD, KERALA



August 2020

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This Manual is needed for the technical persons to be trained as Operators and helpers at the FSTP site at Waynad. It contains Technical Guidelines for carrying out the works. A series of manuals are made, Operation and maintenance manual and Operator Instruction manual are the others.

This Health and Safety Rulebook is presented for the use of all employees of the Faecal Sludge Treatment plant (FSTP) to assist in the administration of our safety program and to provide means and methods that will aid in the performance of various assignments in a safe and efficient manner. Safety is an integral part of everyone's duties and responsibilities.

No part of this document should be reproduced without the consultation with PriMove.

### **ACKNOWLEDGEMENTS**

This Manual has been possible due to the expertise of PriMove technical consultants and a consultation with UNICEF. PriMove will like to particularly acknowledge the support of Director Mr. Ajeet Prabhakar Oak, PriMove, major contribution of Engineer Mr. Rohit Patankar, Project Manager, PriMove, inputs from Suvarna Savant, PriMove and support by Mr. Tithal Parmar, WASH Specialist, UNICEF office for Chennai and Tamil Nadu, suggestions from Ms. Berna Mary Ignatius WASH consultant, UNICEF.

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## ABBREVIATIONS

<b>ACF</b>	Activated Carbon Filter
<b>BDT</b>	Anaerobic Bio Digester Tank
<b>BOD</b>	Biological Oxygen Demand
<b>COD</b>	Chemical Oxygen Demand
<b>CCT</b>	Chlorine Contact Tank
<b>FSM</b>	Faecal Sludge Management
<b>FSTP</b>	Faecal Sludge Treatment Plant
<b>FRP</b>	Fibre reinforced Plastic
<b>HDPE</b>	High density Polyethylene
<b>HP</b>	Horsepower
<b>KMC</b>	Kalpetta Municipality Council
<b>KLD</b>	Kilo Litre per Day
<b>KPCB</b>	Kerala Pollution Control Board
<b>MOC</b>	Material of Construction
<b>MS</b>	Mild Steel
<b>O&amp;M</b>	Operations and Maintenance
<b>PPM</b>	Parts per million
<b>PVC</b>	Polyvinyl chloride
<b>PSF</b>	Pressure Sand Filter
<b>SOP</b>	Standard operating Procedure
<b>SS</b>	Stainless Steel
<b>TBF</b>	Tiger Bio Filter
<b>TDS</b>	Total dissolved solids
<b>TSS</b>	Total suspended solids
<b>UPVC</b>	Unplasticized polyvinyl chloride

## 1. INTRODUCTION

This safety manual has been prepared for use by the operating personnel of the company. Each employee shall be given a copy of this manual. This manual is consistently updated to cover areas relating to the safe operation of wastewater treatment plants. A current copy may be obtained by contacting the company office. Any comments or suggestions on improving this manual or updating information pertaining to the safe operation of equipment is welcome and may be incorporated into future editions.

## 2. NEED OF FSTP

In August 2018, Kerala received heavy rainfall and as a result, witnessed the worst instance of flooding in nearly a decade. Along with the damage to nature, life, and property, a big problem faced due to the floods was the unintended evacuation of faecal sludge from the septic tanks built in people's homes. This incident highlighted the need for comprehensive faecal sludge and septage management (FSSM) in Kerala. Several INGO, NGOs, GOs, and private sector organizations assisted the Government of Kerala for flood rescue and rehabilitation measures. UNICEF and several NGOs were actively engaged in rehabilitation measures in Kerala. As a part of their programme, UNICEF selected PriMove Infrastructure Development Consultants Pvt. Ltd as a Contractor for the construction of a 10 Kilolitre per Day (KLD) Faecal Sludge treatment plant (FSTP). As a result, Kalpetta municipality was selected to install the FSTP with Help of PriMove.

Kalpetta town does not have a sewerage network and fecal sludge is collected in septic tanks and pits. The pits and septic tanks are emptied using suction trucks and it is generally disposed of in an unhygienic manner. Given the terrain and the present habitation, it is not possible to put in a piped sewage collection network and treatment. Faecal Sludge and Septage Management (FSSM) is, therefore, necessary to ensure safe collection and treatment of fecal waste. FSM is necessary for densely populated areas where a proportion of the population is not connected to a sewage system, and the covering and rebuilding pit latrines are not possible. This is the case in most urban areas of developing countries, but such services are also used in developed countries where sewage systems are unavailable. FSM services are usually provided by formal and informal private sector services providers, local governments, water authorities, and utilities. This can lead to surface water and groundwater pollution, spreading of pathogens into the environment and adverse public health impacts

## 3. LOCATION OF PLANT

Kalpetta town is the headquarters of Wayanad district in Kerala. It is a bustling town surrounded by dense coffee and tea plantations and mountains. It lies on the Kozhikode-Mysore National Highway NH 766 (formerly NH 212), at an altitude of about 780 m above mean sea level. Kalpetta is approximately 72 km from Kozhikode and 140 km from Mysore.

Kalpetta is also the centre of tourist activities in Wayanad due to its high location and weather.

1	Site Location	Dumping ground area, Vellaram Kunnu Road, Kalpetta
2	Coordinates	Approx. (11°35'26.30"N, 76° 3'19.56"E)
3	Owner of the FSTP	Hon. Secretary, Kalpetta Municipality
4	Contractor Details	PriMove Infrastructure Development Consultants Pvt Ltd.
5	Required Area	700 Sqm including beautification and garden
6	Technology	Tiger Biofilter Technology

#### 4. FSTP PROCESS

Vermifiltration is a more efficient method of sanitation relative to septic tanks and pit latrines<sup>1</sup>. Earthworms are well known agents that promote digestion of organic waste, producing vermicompost. In vermifilters, worm-based sludge treatment is combined with water filtration to digest organic matter present in septage. The worms need only air, water, and sludge (food) to operate efficiently as a part of the vermifiltration system.

The Tiger Biofilter technique is based on vermifiltration. The technology uses a filtration arrangement consisting of Bio media to trap and treat impurities from faecal sludge / wastewater. The filtration medium is arranged in stacked manner with bio media on top. The top layer serves as active zone habitat for Bacteria and earth worms specifically bred for the purpose, while bottom layers provides structural support and free drainage for clear water. The trapped impurities (Organic matter) are then consumed by bacteria and earth worms as an energy source for metabolism and reproduction resulting in reduction in organic matter (measured as Biochemical Oxygen Demand).

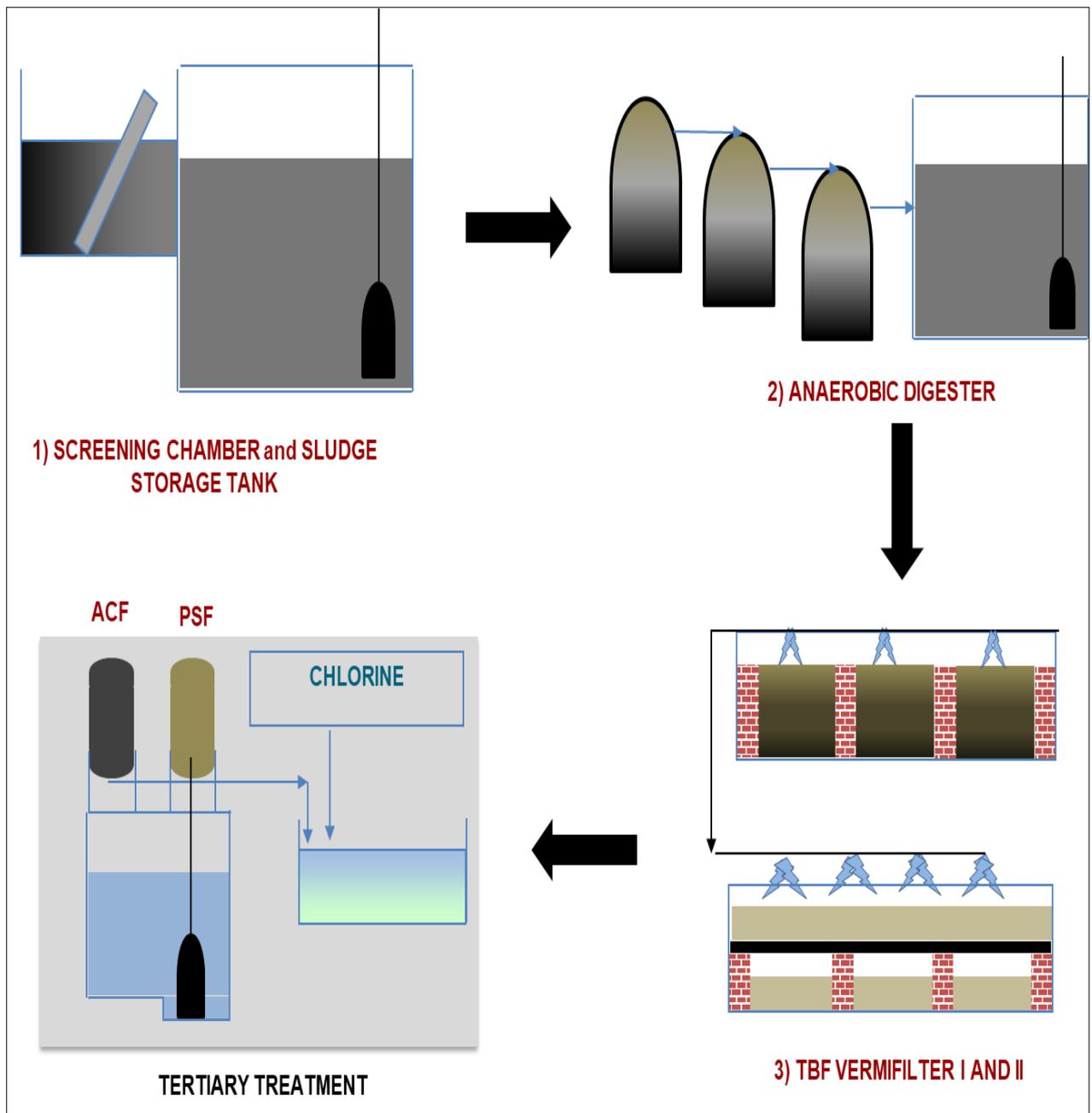
The system is designed with sufficient surface area and worm quantity. The worm consumes the BOD (Organic matter) load in 24 to 72 hours, making beds available for further loading. As natural oxygen transfer occurs, there is no need of artificial air supply in the form of blowers resulting in lesser power consumption and consumables. The process is therefore cost effective and is environmentally- and space- friendly.

Tertiary treatment in the form of Pressure Sand Filter, Activated Carbon Filter and PurAll Chlorination can be used as an option for polishing the effluent.

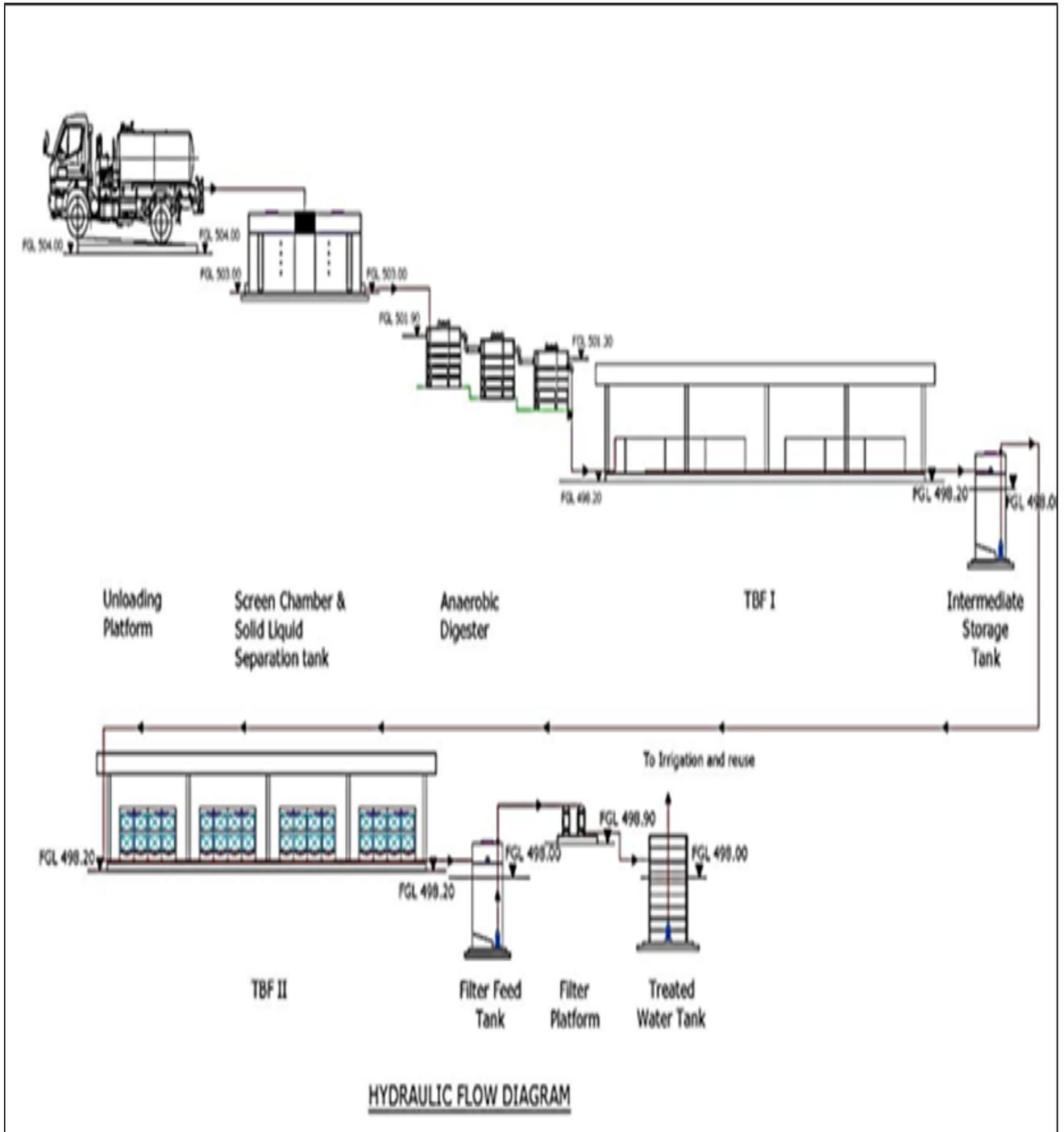
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<sup>1</sup> The technology is adequately studied and researched having references in **Manual on sewerage and sewage treatment (Second Edition)** by CPHEEO and MINISTRY OF URBAN DEVELOPMENT 1993 under chapter 26 EMERGING TECHNOLOGIES FOR SEWAGE TREATMENT point no. 26.3 VERMICULTURE TECHNOLOGY.

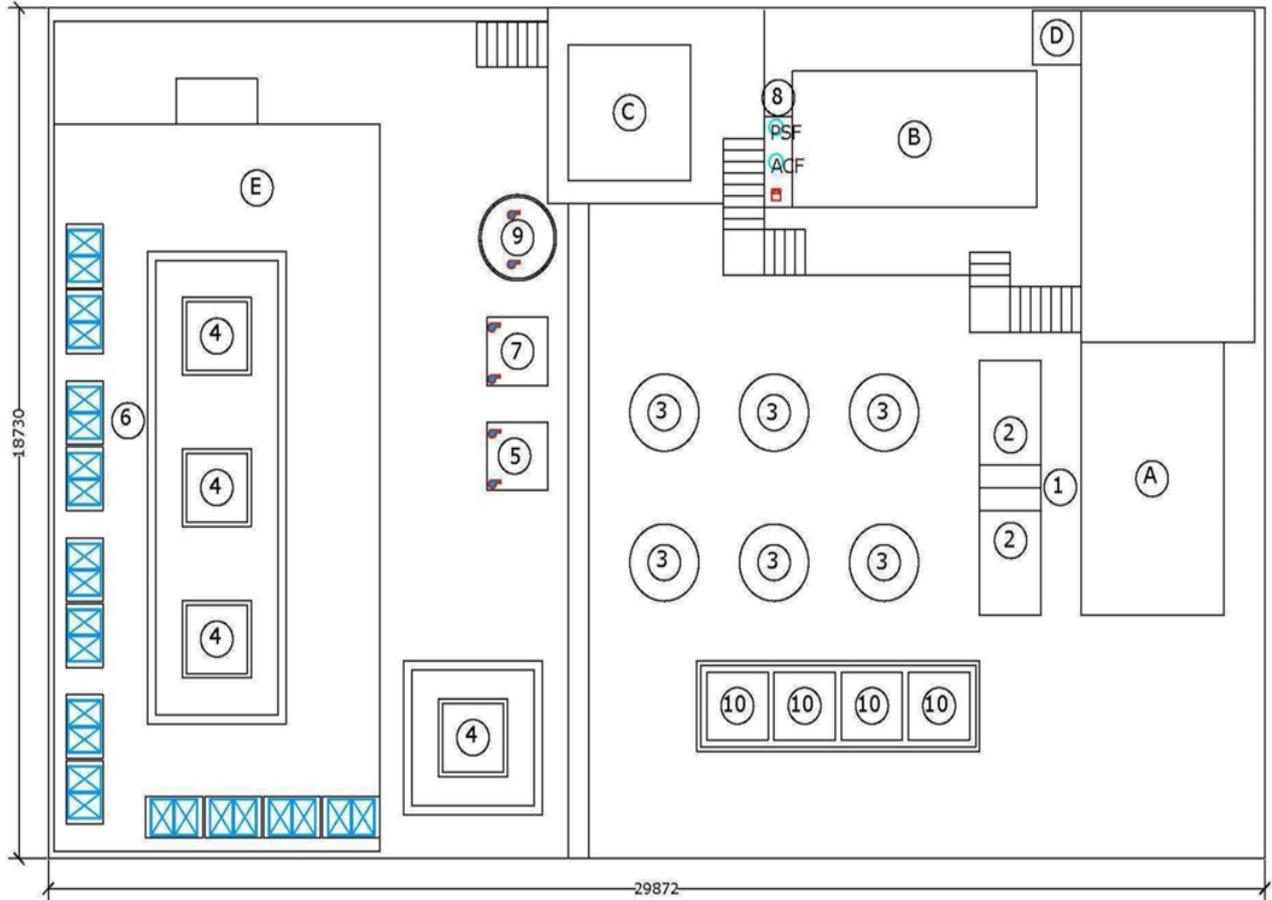
Treatment schematic of FSTP- ACF- Activated carbon filter PSF- Pressure sand filter



Hydraulic flow diagram



Hydraulic flow diagram



**Layout of FSTP kalpetta**

Process Unit Details								
Sr. No	Description	No	L/D	B	H	FB	Total H	MOC
			m.	m.	m.	m.	m.	
1	Screen Chamber	2	1.50	0.50	0.50	0.50	1.50	FRP
2	Solid Liquid Separation tank	2	2.30	1.50	1.50	0.50	2.00	FRP
3	Anaerobic Digester	6	Dia	1.70	1.50	0.50	2.00	HDPE
4	Tiger Bio Filter I	4	3.00	3.00	0.90	0.00	0.90	RCC+ BW
5	TBF II Feed Tank	1	1.50	1.50	2.00	0.50	2.50	FRP
6	Tiger Bio Filter II	12	1.40	0.90	1.50	0.00	1.50	MS + PE
7	Filter Feed Tank	1	1.50	1.50	2.00		2.50	FRP
8	Tertiary Treatment Unit	1	1.50	0.60	0.00	0.00	2.50	RCC
9	Treated Water Storage Tank	1	Dia	1.80	2.00	0.50	2.50	RCC ring
10	Tiger Bio Filter III	4	1.50	1.50	0.90	0.00	0.90	RCC+ BW

Building Details						
Sr. No	Description	No	L	B	H	MOC
			m.	m.	m.	
A	Unloading Platform	1	6.00	3.50	0.00	RCC
B	Admin cum Control room	1	6.00	3.00	3.00	MS+ FRP
C	Store room	1	3.00	3.00	3.00	MS+ FRP
D	Wash room	1	1.20	1.20	2.50	RCC
E	TBF Shed	1	16.0	8.00	2.50	MS

## 5. PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal Protective Equipment (PPE) is required to operate this system safely. The following items should be readily available and properly fitted for operators of this system:

- Hardhat
- Safety shoes
- Safety glasses with side shields
- Sanitizers
- Face shields
- Rubber aprons
- Housekeeping equipment (brooms, mops, spill kits, rags)
- First aid kit
- Safety apron / coat

Photo	Description
	<p>Mask – Always use mask during daily operations</p>
	<p>Hand gloves – Always use hand gloves during operations</p>
	<p>Use safety shoes</p>
	<p>Wash your hand after operations by soap or hand-wash agents</p>
	<p>Use sanitizer before entering the plant, during lunch or breakfast and before leaving the FSTP after completing all tasks</p>

## 5.1 KEY SAFETY SYMBOLS

Symbol	Description
	Alert operators to items that, if not followed, will result in severe injury or death.
	Alert operators to items that, if not followed, may result in severe injury or death.
	Alert operators to items, that if not followed, may result in minor or major injury.
	Alert operators to items that if not followed, may result in damage to equipment or property.

## 5.2 KEY SAFETY WARNINGS

Please pay particular attention to this section. These safety precautions are intended to protect operators from risk of physical harm and damage that may arise from the operation and maintenance of this Faecal Sludge treatment system.

	Do not mix sodium hypochlorite cartridge with any acidic solution. This mixture will generate toxic chlorine gas which is lethal. Common acidic solutions include citric acid, Sulfuric acid, hydrochloric acid, sodium bisulfide (but are not limited to these).
	Rising mains are under pressure (or vacuum). Ensure that piping networks are fully de-pressurized to atmospheric pressure before servicing. Energy release, particularly for anaerobic gases, can cause serious personal injury or death.
	Working on or servicing electrical equipment or mechanical equipment powered by electricity can cause severe injury or death if the electrical source is not completely disconnected and locked out by the service person. Following a documented lock-out, tag-out program is highly recommended for working on equipment in this system.

	<p>Air or anaerobic gases (or other gasses) trapped in UPVC piping or conveyed by UPVC piping can cause severe injury or death. UPVC material shatters if the piping is subjected to abnormal stresses when compressed air is present inside. Pieces of piping become projectiles in this case. Ensure air or anaerobic gases are completely removed from all systems to atmosphere that uses UPVC piping.</p>
	<p>The cleaning of anaerobic digesters having strong sludge. When handling sludge wear appropriate PPE (face shields, full length rubber gloves, rubber apron, safety glasses with side shields) as recommended.</p>
	<p>Appropriate ventilation is required in areas where chlorine tablets are exposed to the operator's air space or equipment that can be damaged by corrosion.</p>
	<p>While removing compost from TBF units, ensure appropriate PPE (full length rubber gloves, rubber apron, safety glasses with side shields) as recommended.</p>
	<p>This plant includes rotating equipment. Pumps and valves all have components that turn with high energy. Before operating equipment with rotating components or pinch points, ensure that all shields, guards, and emergency kill switches are in place and operational. Rotating parts can catch clothing, fingers, or tools and cause serious or equipment damage and injury and may even cause death.</p>
	<p>Maintaining strict cross-connection control is required to protect public health and maintain water quality. The proper operation of these tasks needs to be routinely verified by operations staff. Failure of cross-connection prevention systems can result in release of untreated water into the public water system.</p>
	<p>During construction, maintenance, or any other work performed directly above open tanks, ensure that foreign debris (e.g., mud, soil, sand, tree leaves) do not fall into the tank.</p>
	<p>Operating the system using manual controls introduces the risk of equipment damage. It is highly recommended that the system is monitored carefully and with an operator present if manual controls or partial manual controls are used.</p>

## 6. GENERAL SAFETY PRACTICES

### 6.1 SAFETY - PLANT OPERATION

For your own protection and that of your co-workers, please pay particular attention to this section. These safety precautions are intended to protect operators and equipment from risk of physical harm and damage that may arise from the operation and maintenance of this fecal sludge treatment system.

The figure below summarizes the symbols used in this manual to highlight areas of risk. These warnings are not intended to be exhaustive and the operator and maintenance staff are expected to execute due diligence in carrying out their work on this system. When in doubt, please ask for assistance or advice.



**Door Entry Safety Sign**



**Site Safety Notice**

### 6.2 SAFETY PROCEDURE FOR PLANT OPERATION

Safety training will be provided by Mr. Rohit Patankar (Senior Project Manager) to persons responsible for the plant. The intent is to conduct the operations in a safe and efficient manner, with the utmost regard for the health and safety of the employees and the public.

### 6.3 DAILY SAFETY PRACTICES DURING OPERATION OF PLANT

Working with faecal sludge requires adequate protection for operators. This includes wearing safety shoes, hard hat, rubber aprons, and protective glasses with side shields, protective gloves, and ear plugs if necessary.

#### 6.4 CONTROLLING ACCESS TO FSTP

Access to the FSTP at Kalpetta will be restricted to authorized personnel only. All doors to the plant will be locked, with only authorized persons having keys.

Signs will be posted on the FSTP entrance doors notifying everyone that the entrance to the FSTP is for authorized personnel only.

No fencing is used to control access to the FSTP. Due to the remote nature of site, there is no concern of unauthorised personnel attempting to access site.

- All authorized personnel working in the FSTP must have received Hepatitis A and B vaccine.
- All maintenance must be conducted by the authorised person only.
- Operator must keep the work area clean to minimize the risk of accidents.
- Regular personnel hygiene (like washing hands) is important to prevent illness.
- No person shall drink the water in the plant or the water that is discharged from the FSTP.

#### 6.5 DAILY GENERAL PRACTICES DURING UNLOADING SEPTAGE



**Honeysucker vehicle**



**Preparation for Septage delivery**



**Unloading septage**



**After septage delivery removal of the screening waste**

- Wear personal protective equipment (PPE) during sludge unloading
- Always use Safety Shoes
- Hand gloves to avoid direct contact with septage
- Take precaution during unloading – e.g. proper pipe fitting to the honey sucker vehicle to avoid the spill
- Call emergency services if any accident during daily operations

## 6.6 DAILY GENERAL PRACTICES DURING ANAEROBIC DIGESTION OPERATION



**Control valve using for BDT**



**Air vent control valve for the BDT**

- Use mask, safety coat, goggle, hand-gloves, and shoes daily during valve operating
- Take precautions during sludge transferring, e.g. during valve operation. Handle the equipment carefully to avoid spilling septage
- Do not open the air vent located at end of the BDT series shown above, without proper knowledge.
- Call emergency services in case of any accident.

## 6.7 DAILY GENERAL PRACTICES DURING TBF-I OPERATION



**TBF I control valve**



**Woven coir checking**

- Use mask, safety coat, goggle, hand-gloves, and shoes daily during valve operating.
- Take precaution during checking in TBF-I beds. e.g. do not open valve directly to avoid over feeding of septage
- Use hand-gloves during worms handling and vermicompost collection.

6.8 DAILY GENERAL PRACTICES DURING TBF II



**Flow control valve**



**Woven coir checking**



**TBF II flow arrangement**



**Vermicompost collection**

- Use mask, safety coat, goggle, hand-gloves and shoes daily during valve operating
- Take precaution during checking in TBF-II beds
- Use hand-gloves during worms handling and vermicompost collection

6.9 DAILY GENERAL PRACTICES DURING TBF III (GRIT CHAMBER)



**Grit chamber control valve safe handling**



**Safe handling of vermicompost**

- Use hand-gloves during worms handling and vermicompost collection
- Call emergency services if any accident during daily operations

## 6.10 DAILY GENERAL PRACTICES DURING TERTIARY TREATMENT



**Handling valve for PSF – ACF**



**Chlorination unit**

## 6.11 GENERAL SAFETY PRACTICES DURING PLANT OPERATION

- During checking electrical panel, electricity supply should be kept off.
- During checking and cleaning submersible pumps, main electrical line should be kept off.
- Only use potable water for drinking which is kept in office. Do not use any other water for drinking without informing plant in-charge.
- Keep entry and exit record every time for security reason. Also keep all visitors and workers entry in visitor book
- Do not remove cover from all water storage tanks without permission.
- Call emergency services if any accident during daily operations.

## 6.12 GENERAL SAFETY PRACTICES DURING HOUSEKEEPING

- Materials and supplies used at a plant site should be stored in a neat and orderly manner at the site to prevent them from falling off of shelves onto moving equipment.
- Junk parts removed from a piece of equipment should be disposed of in proper manner.
- Spare parts used in the operation of a wastewater treatment plant should be kept in a neat and orderly manner with the item labelled to indicate on what piece of equipment the spare part is used.

## 6.13 PLANT MALFUNCTION

If there is major problem or failure in the FSTP it would be most likely due to changes in the influent.

Highly Organic Fecal Sludge - In this case, there would be visible effluent problems (part of daily operational checks), coloured effluent (part of daily operational checks) and increased

odours that the operator would note. If such observation occurred during daily schedule, a sample will be taken to try to determine the source of the problem. If such septage issues are observed during routine check-up.

The following other contingent measures can be applied by Kalpetta Municipal Corporation in the event of a malfunction at the FSTP for more than 24 hours:

- Shut down the malfunctioning unit until the malfunction is repaired and use only one of the two parallel units until repairs are completed
- Shut down all water use until the repairs are complete
- Influent should be kept in the holding tank on site until the repairs are complete is another contingent measure. The untreated Fecal Sludge would then be fed to the FSTP when the unit is repaired. This will require the coincidental restriction of water use to minimize the volume of untreated influent being bypassed.

## 7. OTHER SAFETY TERMS

### 7.1 PREAMBLE AND GENERAL PRECAUTION

- Please ensure to read and understand the entire operational and maintenance manual thoroughly.
- Ensure all assembly, operation, maintenance or inspection instructions described in this manual are followed before using any devices included with this plant.
- Keep this annual copy with plant in charge and operators during daily operation
- Always use the units as described by the original manufacturer of the device. Do not use any malfunctioning device
- The plant operator is responsible to inspect each unit before using it. Only use the specific valves or units if it passes inspection.

### 7.2 SAFETY GUIDELINES

There are a number of general guidelines that can greatly improve the safety of operators and visitors to a FSTP-

- **Personal Protective Equipment (PPE):** Wear the appropriate PPE for the job or task being conducted which applies to bystanders as well. Generally speaking, when in the plant environment, mask, coat, safety shoes, hand gloves and safety glasses are highly recommended as a minimum.
- **Housekeeping:** Maintaining cleanliness at plant is the key for minimizing the risk of accidents. Ensure that all tools and loose items are placed in the correct location and that spills are quickly cleaned up.
- **Routine maintenance:** Maintaining equipment in good running order and conducting preventative maintenance on monthly basis can help prevent situations where safety risks are elevated.
- **Personal hygiene:** In any fecal treatment system pathogens can be concentrated in the waste stream. Regular personal hygiene (like washing hands) is important to prevent illness and spread of contamination.
- If operators are exposed to septage or any other water not suitable for human consumption, eyes should be immediately rinsed at an eye wash station and exposed skin should be cleaned thoroughly with soap and warm water, particularly before eating, drinking or smoking.
- **Smoking** in Plant premises is prohibited.

- **Vaccinations:** Due to pathogenic risk at fecal treatment facilities, it is recommended that operators and maintenance staff be vaccinated against tetanus and Hepatitis A and Hepatitis B. Seek medical advice from a licensed physician before exposure to water at the plant and also if you may have been exposed to potential sources of biological hazards. This is particularly important in wastewater systems
- **Fall protection:** The risk of falling into a tank or off an elevated platform can be present. A fall from any height can hurt operators and maintenance staff. Follow the path ways. Always close the tank lid to prevent the falling
- **Eyewash stations:** Safety eyewash systems are typically installed within proximity of plant. Operators need to be trained in their effective use and monitoring systems installed such that assistance can be provided in case somebody uses one of these systems
- **Lighting:** Ensuring that work areas (internal and external) are well lit is important for minimizing risks to operators and also for ease of operations and maintenance.
- **Confined spaces:** Many workplaces contain areas that are confined spaces. While they are not necessarily designed for people, they are large enough for workers to enter and perform certain jobs. A confined space also has limited or restricted means for entry or exit and is not designed for continuous occupancy. Confined spaces include, but are not limited to, tanks, vessels, storage bins, hoppers, vaults, pits, manholes, tunnels, equipment housings, ductwork, pipelines, etc. Occupation safety and Health Administration(OSHA) uses the term "permit-required confined space" to describe a confined space that has one or more of the following characteristics: Contains or has the potential to contain a hazardous atmosphere;
- Ensure workers are trained to recognize confined spaces and only trained personnel should be permitted to enter confined spaces when the appropriate safeguards are in place.
- **Safety culture:** every month take a meeting where safety discussions happen before all maintenance operations, where operators are free to raise safety concerns without retribution.
- Safety should be built into all routine work and standard operating procedures at the plant and all maintenance work should be prefaced with a discussion on safety for the work at hand. This builds a culture where safety is a top priority and helps ensure all workers go home healthy at the end of their day.

- **Harmful gas safety procedure:** In the event of a power outage (a period when a power supply or other service is not available or when equipment is not available or when equipment is shut down) or any situation resulting in a system shutdown lasting more than 24 hours-Put the fecal sludge treatment plant main power switch into the OFF position.
- Prior to entering, open at least two (2) or more fecal sludge treatment plant openings (manholes) or vent ports to encourage air exchanges

## 8. FIRST AID PROCEDURES

First Aid is the immediate and temporary treatment of a victim of sudden illness or injury while awaiting the arrival of medical aid. Proper early measures may be instrumental in saving life and ensuring a better and more rapid recovery.

The avoidance of unnecessary movement and over-excitation of the victim often prevents further injury. Conditions that require immediate attention to avert death include cessation of breathing (asphyxia), severe bleeding, poisoning, strokes, and heart attack.

The essentials of first aid treatment also include the correct bandaging of a wound; the application of splints for fractures and dislocations; the effective methods of cardio pulmonary resuscitation (CPR) and artificial respiration; and treatment of shock, fainting, bites and stings, burns, and heat exhaustion.

### 8.1 ASPHYXIA AND OBSTRUCTION OF AIR PASSAGES

Symptoms: Blue discoloration of face, tongue, and lips; gasping; inability to speak; unconsciousness.

Treatment: First try the Heimlich manoeuvre, grasping the victim from behind with hands linked in front and compressing the abdomen just below the ribs. Encourage victim to cough up foreign objects in throat; as a last resort, rap victim between shoulder blades to dislodge object. For asphyxia caused by gas or fumes, remove victim to a clear atmosphere; use artificial respiration.

### 8.2 BITES AND STINGS

Symptoms: Wound (animal or human bite) or swelling and pain (insect sting).

Treatment: For animal and human bites, cleanse wound with soap and water and apply antiseptic containing iodine; submit animal for rabies test. For poisonous snakebite, cooling the site of the wound with ice will slow down absorption of poisons; antivenin treatment is required only for a small number of reptile bites.

Prevent exertion and ingestion of stimulants by victim. For insect stings, apply cortisone ointments, soothing lotions, or cool compress. Persons who are allergic to insect stings should carry adrenaline with them at all times. Papain, the main ingredient in "meat tenderizer," is effective in coral sting injuries.

### 8.3 BURNS

Symptoms: Redness (first-degree burns), blistering (second-degree burns), charring of skin (third degree burns)

Treatment: Cold water may be applied to first- and second-degree burns. All burns should be covered with sterile non-adherent dressings. Chemical burns should be washed with large quantity of water; vinegar may be added to the water for alkali burns, and sodium bicarbonate may be added to the water in case of acid burns.

#### 8.4 FAINTING

Symptoms: Unconsciousness, paleness, rapid pulse, coldness of the skin, sweating.

Treatment: Leave victim lying down, loosen clothing, roll victim to the side, and wipe out mouth in the event of vomiting.

#### 8.5 FOREIGN BODY IN THE EYE

Symptoms: Pain, redness, burning, tears.

Treatment: Pull down lower lid and remove un-embedded object with clean tissue if it lies on the inner surface of lower lid. If object has not been located, pull upper lid forward and down over lower lid. Object can be removed from surface of upper eyelid by turning lid back over a swab stick or similar object and lifting off the foreign body with a clean tissue.

Finally, flush the eye with water. If object is suspected to be embedded, apply a dry, protective dressing over eye, and call physician or take patient to hospital emergency room.

Keep victim from rubbing the eye. For chemical burns, flood eyes with water.

#### 8.6 FRACTURES AND JOINT INJURIES

Symptoms: Pain or tenderness, deformity of bones, swelling, discoloration.

Treatment: Prevent movement of injured parts until splint is applied; treat for shock; if ambulance service is not available, splint entire limb before moving. For sprains, elevate affected part and apply cold compresses. Elastic bandages may be used for immobilization.

#### 8.7 HEAT EXHAUSTION

Symptoms: High temperature (as high as 108–112°F/42–44°C), hot dry skin, rapid pulse, possibly unconsciousness.

Treatment: Immediately undress victim and sponge with or immerse in cool water or wrap in water-soaked sheets. Use fan or air conditioner.

## 8.8 POISONING

Symptoms and signs: Information from victim or observer, stains about mouth, presence of poison container, breath odor, and pupils contracted to pinpoint size from morphine or narcotics.

Treatment: Dilute ingested poison by administering water or milk, administer specific antidote if described on label of commercial product. Do not induce vomiting if poison is strong acid, strong alkali, or petroleum product, or if victim is unconscious or convulsive. Syrup of Ipecac available without prescription at pharmacies may be administered to induce vomiting in other cases. A universal antidote contains Ipecac and activated charcoal; the latter absorbs the poison and the former causes it to be expelled.

## 8.9 SEVERE BLEEDING/WOUND

Symptoms: External wound.

Treatment: Apply pressure over wound with wad of sterile gauze or other clean material. If bleeding continues and no fracture is present, elevate wound. If bleeding still continues, apply pressure to blood vessels leading to area in arm, press just below armpit; in leg, press against groin where thigh and trunk join.

Use a tourniquet (tight band that cuts off circulation) only when it has been decided that the sacrifice of a limb is necessary to save life.

## 8.10 SHOCK

Symptoms: Pale (or bluish) skin (in victim with dark skin examine inside of mouth and nail beds for bluish coloration), cool skin, weakness, weak pulse; unresponsiveness and dilated pupils in later stages.

Treatment: Keep victim lying down and covered enough to prevent loss of body heat. The body position should be adjusted according to the victim's injuries. Victims in shock may improve if the feet are raised 8 to 12 in. (20–30 cm). For electric shock, cut off current or separate victim from contact with electricity by using dry wood, rope, cloth, or rubber; administer CPR.

## 8.11 SPILL

In the event of a spill at the FSTP, the on-site emergency response team will be notified as per Kalpetta Municipal Corporation (KMC) protocol. Spill of septage or spill of any microbial culture observed during daily routine check-up then, Instructions from the on-site emergency response team will be followed by all personnel at the FSTP.

## 9. FIRST AID KIT CHECKLIST

### 9.1 TOOLS

- Small Scissors
- Tweezers
- Needle
- Suture thread
- Sterile disposable gloves
- Surgical mask
- Stethoscope
- Emergency eye wash kit
- Antiseptic liquid
- Wet wipes
- Tissue paper

### 9.2 BANDAGES AND CLOTHS

- Adhesive Bandages various sizes and shapes
- Surgical Gauze
- Surgical Tape
- Skin Tape/Butterfly closure strips
- Eye Pads
- Cotton Pads and cotton balls
- Large cloth bandages
- Ace bandages

### 9.3 WOUND CLEANING AND CARE

- Antibiotic Ointment or cream
- Iodine
- Sterile alcohol wipes
- Spray or cream; for mild burns
- Calamine Lotion or powder
- Anti-fungal cream
- Petroleum jelly
- Saline solution

### 9.4 MEDICINE

- Tylenol or Aspirin
- Children's pain reliever/fever reducer

- Medicine for upset stomach
- Anti-Diarrhoea Medicine
- Anti-histamines or anti-allergen pills

#### 9.5 IMPORTANT TIPS

Sterilize all tools (scissors, tweezers) first. Use alcohol swabs or heat with a lighter or matches. All bandages should be sterile Individual bandages should be sealed in individual packages. Ensure guides have instructions on how to perform life-saving techniques on children and infants as well. Be aware of any drug allergies. Have them listed in case further medical attention is necessary. Toss the emetics medicines used to induce; vomiting, like syrup of ipecac, are no longer recommended for use.

## 10. NOTE ON DISASTER MANAGEMENT

Landslide management - Wayanad witnessed a very severe round of Flood and Landslides, during the month of August 2018. The disaster was naturally triggered, as a result of torrential rainfall. The rainfall received during the spell was unprecedented and extremely heavy, which resulted in an increase of the water level along the length and breadth of Wayanad. All the villages in the district were affected by flood and many of them affected by landslide also. In addition to flood and landslide, typical geographical disasters, such as land subsidence and land fissure, also occurred at some places in the district.

Flood management: The flood and landslides that hit the district in a major way, were mitigated through well laid out disaster management efforts of the District Disaster Management Authority (DDMA), Wayanad. It was a race and test against time, resource, strength, and capacity; but all those tests were successfully cleared to ensure that the disaster was effectively managed and mitigated.

### 10.1 PRECAUTIONS DURING HEAVY RAIN

- We have taken all necessary precautions before building the plant. This includes survey and risk assessment results while building the retaining wall
- No water logging will occur because the terrain we have selected is suitable during high rain also.
- We have taken all precautionary actions about landslide management. The plant location was selected after surveys of the area.
- For flooding situations, we have taken all precautions to avoid water logging, and have undertaken flood prone arrangements.

### 10.2 PRECAUTIONS TO BE TAKEN

- Plant In-charge should be contact with Municipality emergency team during heavy wind or rainfall condition for receiving regular updates about the weather conditions
- During heavy rainfall, the main electrical connection should be switched off.
- Do not pass septage during this period, because if electrical connection is off, the pump is unable to run.
- Close all the valves before shutting downs the plant operations
- Note down all units' information and breakdowns if any, after heavy rain.

### 10.3 DISCLAIMER

This disclaimer applies before, during and after use of the device, which include, without limitation, assembly, inspection, use and or storage. No warranties (express, implied, or statutory) are made in connection with this operational and maintenance manual.

BY REFERRING TO, OR OTHERWISE EMPLOYING, THIS OPERATIONAL AND MAINTENANCE MANUAL, THE OPERATOR, USER OR OWNER OF THE PLANT AGREES TO DEFEND, PROTECT, INDEMNIFY, AND HOLD PRIMOVE, ITS AFFILIATES, SUBSIDIARIES, SUCCESSORS, ASSIGNS, DIRECTORS, OFFICERS, AGENTS, AND EMPLOYEES HARMLESS FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, DAMAGES AND LIABILITIES, DIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING FROM ACCEPTANCE OR USE OF THIS MANUAL, INCLUDING LOSS OF PROFITS AND REASONABLE ATTORNEY'S FEES, WHICH MAY ARISE OUT OF THE ACCEPTANCE OR USE OR ALLEGED USE OF THIS MANUAL, IT BEING THE INTENT OF THIS PROVISION AND OF THE OPERATOR, USER OR OWNER TO ABSOLVE AND PROTECT PRIMOVE, ITS AFFILIATES, SUBSIDIARIES, SUCCESSORS, ASSIGNS, DIRECTORS, OFFICERS, AGENTS, AND EMPLOYEES FROM ANY AND ALL LOSS RELATING IN ANY WAY TO THIS OPERATIONAL AND MAINTENANCE MANUAL INCLUDING THOSE RESULTING FROM ITS OWN NEGLIGENCE.