Hikkaduwa
Sanitation Safety Plan

APRIL 2024

Revision 0

Introduction

Waste water treatment, the removal of impurities from wastewater, or sewage, before it reaches ground or natural bodies of water such as rivers, lakes, estuaries, and oceans. Since pure water is not found in nature (i.e., outside chemical laboratories), any distinction between clean water and polluted water depends on the type and concentration of impurities found in the water as well as on its intended use. In broad terms, water is said to be polluted when it contains enough impurities to make it unfit for a particular use, such as drinking, swimming, or fishing. Although water quality is affected by natural conditions, the word pollution usually implies human activity as the source of contamination. Water pollution, therefore, is caused primarily by the drainage of contaminated wastewater into surface water or groundwater, and wastewater treatment is a major element of water pollution control.

It soon became necessary for all water closets in the larger towns to be connected directly to the storm sewers. This transferred sewage from the ground near houses to nearby bodies of water. Thus, a new problem emerged: surface water pollution.

Definition of Terms

Biosolids – organic materials resulting from the treatment of sewage and septage sludge; residue generated during the treatment of domestic sewage and septage in a treatment facility

NWS&DB – National Water Supply and Drainage Board

Desludging — the process of cleaning or removing the accumulated domestic sludge or septage.

Dewatering — this is the process of reducing the moisture content of sludge to lessen the volume and odor, e.g. vacuum, filter, centrifuge, belt filter press, filter press, sludge drying beds, lagoons.

Disinfection — this is the process of destroying pathogenic organisms either by physical (e.g. application of heat) or chemical (e.g. chlorine application) means.

Effluent – general term denoting any wastewater, partially or completely treated, or in its natural state, flowing out of a manufacturing plant, industrial plant or treatment plant.

Influent – waste water flowing through the sewer lines/conveyance into a treatment plant

Septage - also known as Domestic Sludge — solid particle of domestic sewage, which settles at the bottom of the sedimentation tank and is digested by anaerobic bacteria, purely from domestic sources, exclusive of industrial and hazardous wastes.

Sewage - or also known as Domestic Sewage — wastewater composed of raw liquid and solid waste coming from residential and commercial uses, exclusive of industrial and hazardous waste.

Wastewater – Septage and Sewage

Developments in sewage treatment

It used to be said that "the solution to pollution is dilution." When small amounts of sewage are discharged into a flowing body of water, a natural process of stream self-purification occurs. Densely populated communities generate such large quantities of sewage, however, that dilution alone does not prevent pollution. This makes it necessary to treat or purify wastewater to some degree before disposal.

The construction of centralized sewage treatment plants began in the late 19th and early 20th centuries in the world. Instead of discharging sewage directly into a nearby body of water, it was first passed through a combination of physical, biological, and chemical processes that removed some or most of the pollutants. Also beginning in the 1900s, new sewage-collection systems were designed to separate storm water from domestic wastewater, so that treatment plants did not become overloaded during periods of wet weather.

After the middle of the 20th century, increasing public concern for environmental quality led to broader and more stringent regulation of wastewater disposal practices. Higher levels of treatment were required. For example, pretreatment of industrial wastewater, with the aim of preventing toxic chemicals from interfering with the biological processes used at sewage treatment plants, often became a necessity. In fact, wastewater treatment technology advanced to the point where it became possible to remove virtually all pollutants from sewage. This was so expensive, however, that such high levels of treatment were not usually justified.

Wastewater treatment plants became large, complex facilities that required considerable amounts of energy for their operation. After the concern for energy conservation became a more important factor in the design of new pollution control systems. Consequently, land disposal and subsurface disposal of sewage began to receive increased attention where feasible. Such "low-tech" pollution control methods not only might help to conserve energy but also might serve to recycle nutrients and replenish groundwater supplies.

In today's increasing number of challenges brought about by the impacts of human diseases due to scarce or improper use of sanitation facilities, communities must establish a system to address these challenges and limit the effects. Aside from adequacy of sanitation facilities, situations such as inadequate containment, improper treatment and handling of excreta and wastewater need to be addressed as well as it contributes to the problems. The National Water Supply and Drainage Board (NWS&DB) initiates the development of Sanitation Safety Planning to cover the entire country. At that situation Galle District first Waste water reclamation unit was established in Hikkaduwa area with Natural pong system t consists of inlet structure, three treatment lagoons (two facultative ponds and one maturation pond) and a decanting structure at the outfall for discharge of treated effluent.

STP at Hikkaduwa treats the sewage that is collected by the sewerage system as well as by the septage from tankers. It consists of a number of treatment processes. Inlet works remove grit and gross non-biodegradable materials such as plastic. In facultative ponds, settable solids are removed. Polishing and disinfection occurs in maturation ponds. Treated effluent from STP at Hikkaduwa is discharged during the receding tide every day by manual decanting from the maturation lagoon to the Hikkaduwa river. SPT at Hikkaduwa is equipped with two facultative lagoons with a capacity of 6500 m3 and 6200 m3 and one maturation pond with the capacity of 7000 m3. The normal process train is to operate the three lagoons in series so as to pass sewage after going through the inlet works enters lagoon 1 and is discharged eventually from lagoon 3. Finally all sewage leaves the plant via the manually operated decant structure. All lagoons are equipped with baffles to support inflow distribution and to avoid short circuiting. The flow from the inlet works (flow splitter) to the facultative lagoons is bifurcated to support inflow distribution in facultative ponds. Floating booms are attached to the top of the baffles so that any floating scum, grease or debris from the sewage feed is trapped and contained for ease of daily removal by STP operators.

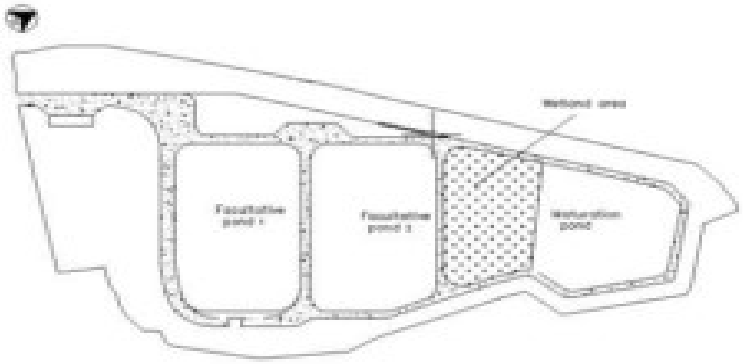


Figure 01. Hikkaduwa WR

Within Hikkaduwa divisional Secretariat area wastewater is managed by 1) Hikkaduwa Water Reclamation (WR) operated by National Water Supply and Drainage Board (NWS&DB) and 2) Septage Treatment Plant (STP) operated by Hikkaduwa Local Authority (LA). The coverage area includes Hikkaduwa , Rathgama , Boossa, Galle, Karapitiya, Baddegama, Gonapinuwala, Ambalangoda and Elpitiya Gramanialadhari divisions.This SSP was done for the above two wastewater management systems.

Hikkaduwa WR is a combined sewerage and septage treatment facility, which receives sewage coming from the sewered areas of , Hikkaduwa & Unsewered areas Rathgama , Boossa, Galle, Karapitiya, Baddegama, Gonapinuwala, Ambalangoda and Elpitiya. The effluent processed in this facility is received by the Hikkaduwa lagoon, which eventually drains to the Indian Ocean. A proposal is made to sell the bio-solids to a third party contractor in future, which currently used as fertilizer in the plant premises.

STP owned by the Hikkaduwa LA accepts the sptage transported from Vacuum Truck Units (VTU) from unsewered areas of nearby Hikkaduwa . Biosolids generated from treatment process are sold as fertilizer to the third party buyers. Treated effluent is used to wet the solid waste in the adjacent composting plant.

With this SSP, NWS&DB aims to identify all potential hazards and quantify the risk associated to exposure to the sewage and septage collected as well as exposure to the end-products produced by the treatment facility, particularly the effluent and the dried bio-solids

Pump Stations

Pump Station-1

- Pump Capacity – 6m3/hr
- 2nos of pumps

Pump Station -2

- Pump Capacity –16m3/hr
- 2nos of pumps

Pump Station -3

- Pump Capacity – 40m3/hr
- 3nos of pumps

Pump Station -4

- Not Functioning after the Tsunami in 2004

Pump Station -5

- Pump Capacity – 6m3/hr
- 2nos of pumps

Pump Station -6

- Pump Capacity – 6m3/hr
- 2nos of pumps

MODULE 1

PREPARATION OF SANITATION SAFETY PLAN

1. PREPARATION OF SANITATION SAFETY PLAN (SSP)

1.1 Establish priority areas or activities

1.2 Objectives

The NWS&DB SSP aims to mitigate any adverse health effects upon the exposure of workers, users and community to the wastewater (sewage and septage) during collection and transport, treatment and disposal including maintenance activities.

1.3 System Boundary

The WWTS has facilitated to handles both sewage and septage from customers. The sanitation system for this SSP is described in **Figure 1**. In this figure, the sanitation boundary is along the Galle road, one end is located middle of the Hikkaduwa town which near the Tourist Police Narigama. , and other end is Thuduwegoda Tsunami Housing scheme. It was located in between Galle rad and the Railway tract. Each of these connection was maped.

Figure 1. Boundary in the scheme

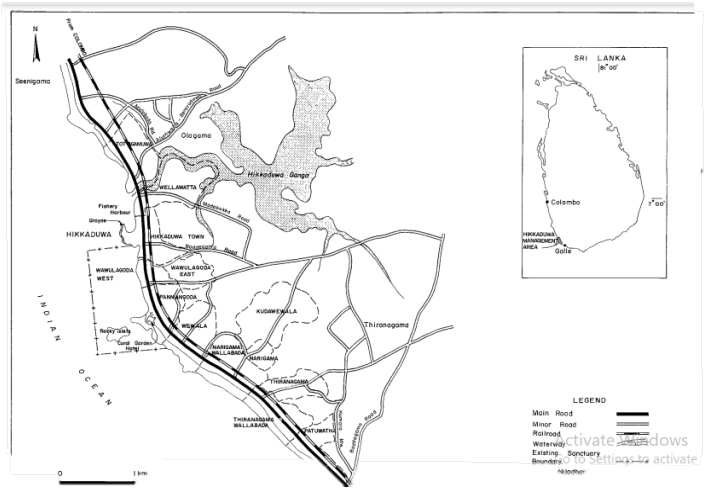


Figure 02 Hikkaduwa Town Area

Within the identified boundary, all exposed groups and the associated health-risks are also identified. **Table 1** lists the components and activities that define the SSP boundary.

Table 1: List of Activities Included in the SSP

Components/Activities	Lead Organization
1. Collection of sewage through the sewer lines	SSP Team (NWS&DB)
2. Receive septage through vacuum truck units (VTUs)	LA,MC's /Third party vacuum truck Owners
3. Treatment of sewage and septage at the treatment plant	SSP Team (NWS&DB)
4. Repair and maintenance of sewer network	SSP Team (NWS&DB)
5. Repair and maintenance of VTUs	Hikkaduwa LA /Third party vacuum truck Owners
6. Processing of biosolids	SSP Team / Hikkaduwa LA /3rd party contractor
7. Reuse of treated effluent	Hikkaduwa LA/Contractor / Land owners

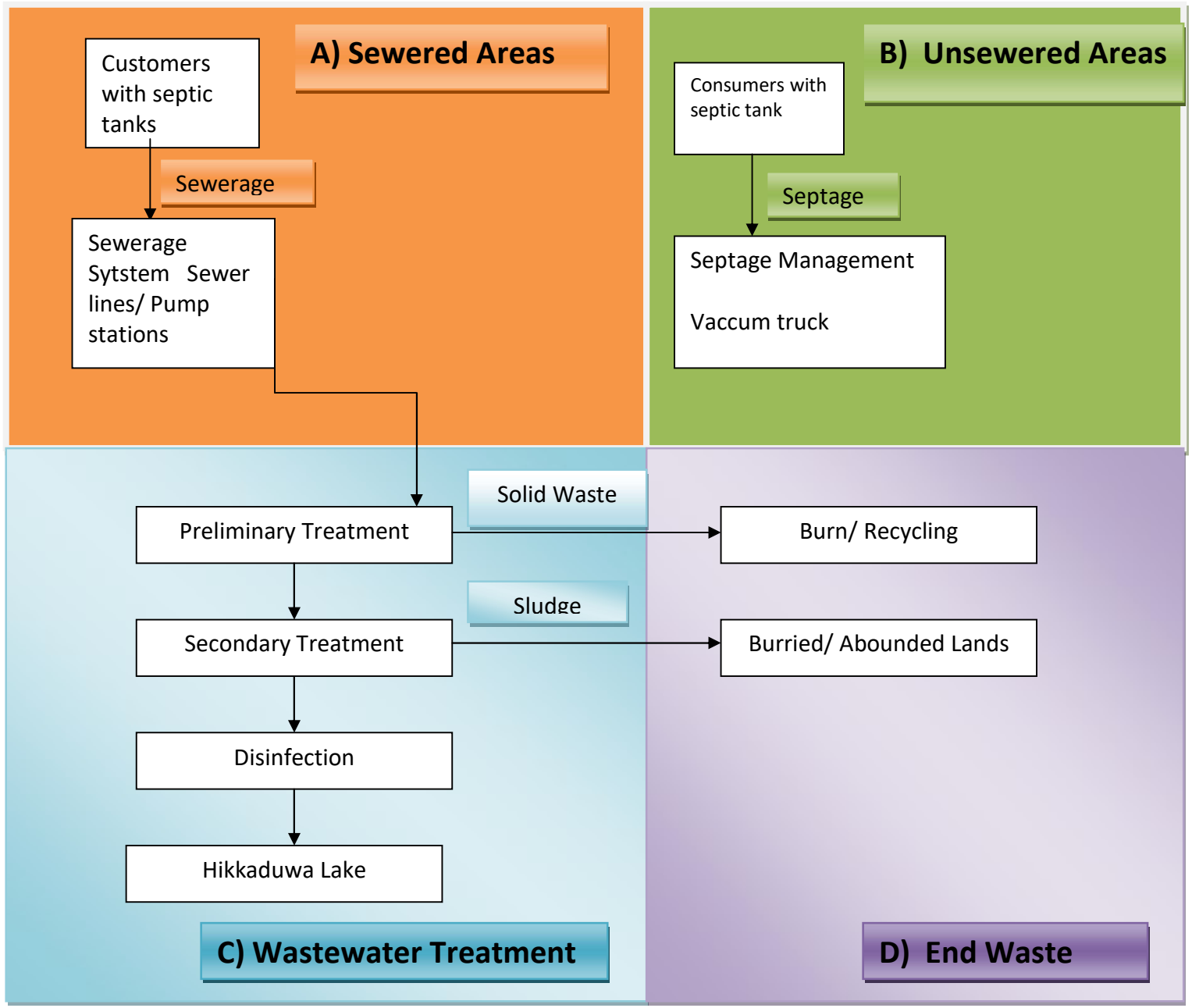


Figure 3: System Boundary for the Hikkaduwa Sanitation Safety Plan

(A) Sewered Areas

A total of 193 no of accounts are connected to the sewer lines of the Hikkaduwa WR. Details of the consumers are attached in Annex II. These sewer lines are connected to 5 pump stations and 82 manholes spanning 5 kilometers of sewer line. The new sewer network of sewered areas served by the WWTS is identify and plan to future renovation by NWSDB funds.. The old sewer network is still under mapping stage.

(B) Unsewered Areas

In most unsewered areas, sewage is handled by septic tanks. Houses with septic tanks located in these areas are served by the 3rd party Vacuum Truck Unit (VTU) owners on request. As for households that have no septic tanks, the sewage is discharged directly to drainage **Figure 4** shows the map of the septage collection areas served.

Hikkaduwa WWTS does not provide the service of VTUs. However, it accepts loads from 3rd party VTU owners at a price. Hikkaduwa LA owns two VTUs which transport septage to the treatment plant. The septage collection is not a routine process. Consumers request to empty their septic tanks when required.

Once the VTUs have reached the area, the personnel prepare the hose to be used, open the septic tank and proceeds with the desludging. Once desludging is finished, the personnel cover the septic tank. Sealing of the cover of the septic tank falls within the responsibility of the customer. The personnel move to desludge another septic tank until the VTU has reached its maximum capacity. The VTUs then proceed to the treatment plant where septage will be treated for proper disposal.

In addition to the Hikkaduwa wastewater treatment plant, the septage treatment plant owned by Hikkaduwa LA collects the septage from the above area using VTU owned by them.

(C) Hikkaduwa Water Reclamation

The Hikkaduwa Waste water Treatment System **(Figure 5)** is a joint sewage and septage treatment plant located bounded to the Galle district. The treatment facility is designed to handle a total flow of 1,100m^3/day of sewage coming from the 5 Square kilometers of sewerage area. Septage is treated along with the sewerage in the same process.

The facility is a waste stabilization pond system designed to treat incoming sewage and septage following the standards specified in The National Environmental Act, no. 47 of 1980.

(D) Septage Treatment plant at Hikkaduwa Local Authority

Hikkaduwa LA manages the solid waste in Monraviawatte Solid waste reclamation center and they separate in two different plants located in the same premises. The solid waste is further categorized into groups at solid waste treatment plant.

STP (**Figure 3**) treats septage from Hikkaduwa in to biosolids and treated effluent which is reused for wetting of compost piles.

(E) Wastes and End-Products

Treatment Plant Effluent

The wastewater coming to the treatment plant is cleaned and discharged into the Hikkaduwa Lagoon

Biosolids

The waste deposited on first lagoon take out from Gully succor and transport to cultivated lands specially coconut and cinnamon which are not harvest short period of time

Screenings and other Wastes

The screenings and other solid wastes removed from the WWTS collected in a bucket and burnt in a large pit within the premises. Grit and oil removed from primary treatment are disposed directly in to the ground. Future recommend to separated garbage to LA via Solid waste collection Cener.

Figure 1: Location of Hikkaduwa Wastewater Treatment Plant

Figure 2: Coverage Area of Hikkaduwa Wastewater Treatment System

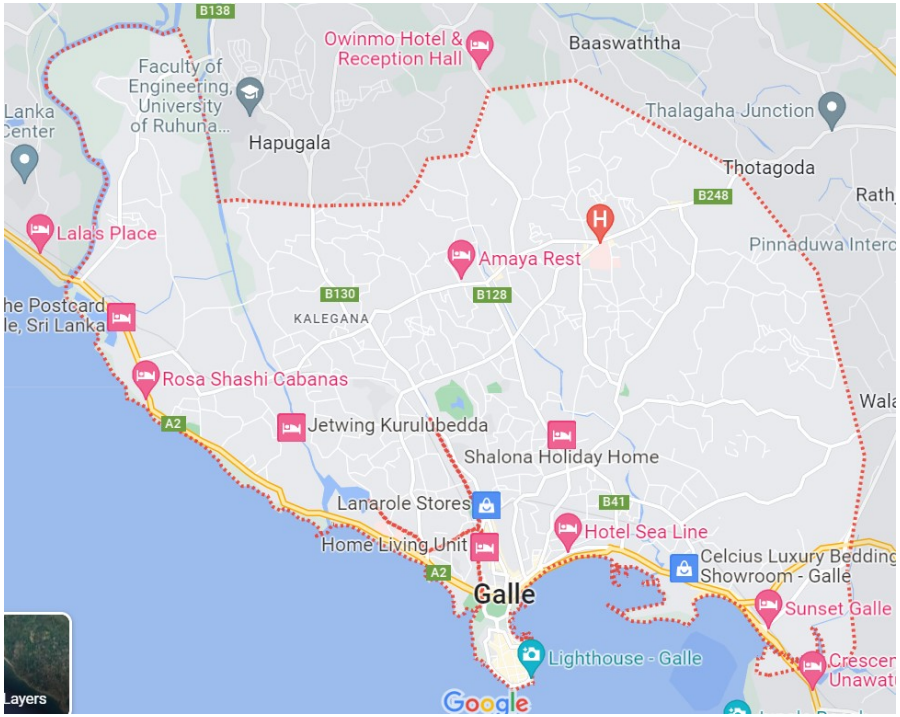
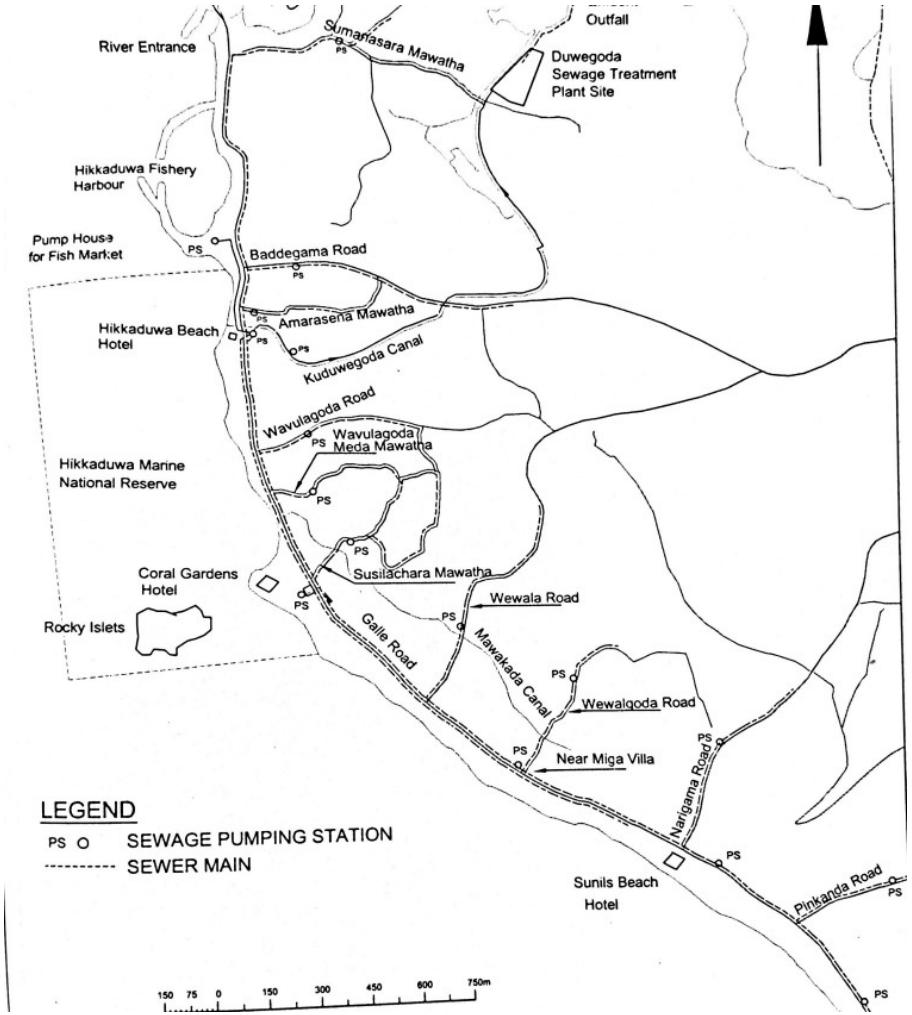


Figure 3: Hikkaduwa WWTS's Septage Management Collection Area

Figure 4 : Sewer Network of Hikkaduwa Wastewater Treatment System



(E) Exclusions in the System Boundary

The SSP has excluded some components that lack of information. The leach field, internal house drains and the municipal drainage where the effluent of individual septic tanks discharges are not included.

The sizes, configurations and conditions of the septic tanks in Hikkaduwa are highly variable. Although there are existing prescribed national standards for septic tank design and construction, most tanks constructed in Hikkaduwa are under-designed and not according to specifications. Most have leaching chambers while some still use leach drains for effluents, posing risks of contamination to groundwater, which is a source of water supply.

In addition, the third party contractor who will buy the biosoilds for the purpose of making fertilizer and the users of the above fertilizer are not involved in preparation of the SSP and information on the products on which the fertilizer was used is limited. This will later be considered in the SSP once the contractor has been selected.

These compartments inside the SSP system boundary will not be included at this stage, but this may be re-visited in the future when enough information is collected and a wider range of participation is achieved.

1.4 SSP Team

In order to ensure the continuous implementation and improvement of the SSP, an established SSP Team Hierarchy (shown in **Figure 6**) has been formed. The team is composed of regular staff from the various units of NWS&DB. In addition to the NWS&DB staff, representatives of the Ministry of Health and the 3rd-party contractor for the bio-solids processing are included in the SSP Team.

The National Steering Committee for the SSP composed of representatives from the World Health Organization (WHO), Ministry of Health (MOH), Central Environmental Authority, Department of Irrigation, Wild Life Conservation department, Forest Conservation Department , Marine Environmental Protection Authority and Department of Agriculture (DA) serve as SSP advisers.

The Core Team led in the preparation of the SSP. The SSP Team Leader, Assistant Team Leader, and the team managed the development of the SSP and reviewed and will approve any succeeding revisions. The SSP Team is managed under the operational committee of NWS&DB and Hikkaduwa LA. NWS&DB operational team further divided into 2 groups as Team Leader and the stake holders. Hikkaduwa LA operational committee consists of the supervisors and the team under normal operational conditions. Special team is appointed for the festival season to ensure the safety of pilgrims. The internal and the external Advisory Committees give guidance where necessary.

The internal Advisory committee consists of personals from Regional Support Center (Southern) (RSCS) of NWS&DB and the External Advisory Committee is made of Personals from Water Reclamation division of NWS&DB.

Regional manager of Galle is the team leader of the SSP Team and responsible for ensuring the implementation of SSP. Area Engineer of Ambalangoda is the Assistant team leader. Officer In charge of Hikkaduwa , Electrical Engineer, Mechanical Engineer, Senior Chemist, and senior sociologist are assigned in to the SSP Team.

Table 2: The SSP Team Members

SSP Team Member	Name	Position
Team Leader	P.N.G Pathirana	Regional Manager (Galle)
Assistant Team Leader	D.G.S.L Wijerathna	Area Engineer (Ambalangoda)
Team Members	D.S.S Zoysa	Senior Chemist
	H.R.S Niroshani	Cheif Sociologist
	P.D.D.N Kumudu Kumari	Electrical Engineer
	K.G.C .Lankara	Mechanical Engineer
	R.A. Dinesh Chandana	Officer In Charge (Hikkaduwa WR)
	K.S. Pathirana	OIC (Hikkaduwa (O&M)
	K.M. Balakrishnan	Board Labour
	E.L Gurusinghe	Contract Labour
	D.S.P Disanayaka	Contract Labour
Hikkaduwa LA Committee	C.B.K. Janaka Gurusinghe	Divisional Secretary, Hikkaduwa
	M.B.P. Janaki	Urban Council, Hikkaduwa
	S.L. Wickramasinghe	District Marine Environment Officer- Galle, MEPA
	Hemantha Jayasinghe	Deputy Dirrector - Central Environmental Authority- Southern office
Internal Advisory Committee	K.G.N Saman Kumara	Deputy General Manager (Southern)
	S. K. Samantha Kumara	Assistant General Manager
	M. K. J. Probodini	Chief Engineer (Sector Planning)
External Advisory Committee	D. N. De. S. Gunatileke	Addl.General Manager (Water Reclamation)
	G.D.N. Neville	Deputy General Manager (Water Reclamation))
	K. A.K.G. Kuruppu	Assitant General Manager (Water Reclamation)

MODULE 2

SYSTEM DESCRIPTION

2. SYSTEM DESCRIPTION

The Regional Manager handles the provision of sewer service connections, maintenance and repair of the sewer network, handling of customer complaints, operation and maintenance of the wastewater facilities, and planning for sewerage coverage expansion. For the sanitation services, its main tasks include provision of regular cleaning services of septic tanks, operation and maintenance of the septage treatment plant, handling of customer complaints, fleet maintenance, and planning for sanitation coverage expansion.

Sewered areas are provided with sewerage services that include installation of new sewer service connections, operation and maintenance of sewage treatment facilities, conveyance systems and the sewer network. On the other hand, areas that cannot be connected to the sewer lines, but have septic tanks, are provided with sanitation services that include desludging of septic tanks on request, as well as the coordination works with the customers.

2.1 System Map

A. Hikkaduwa Wastewater Treatment System

The system starts from households and commercial establishment where wastewater is generated. Households and commercial establishment are either connected to the sewer line (see Annex IV) or serviced by VTUs to enable transport of the wastewater to the treatment plant In addition to households wastewater from commercial customers is accommodated as long as their waste is domestic in nature. This is verified through a field investigation of the commercial establishment. In areas where sewer lines are available, commercial establishments can be connected to the nearest sewer line and required to have oil and grease trap to prevent oil and grease to discharge to the sewer lines.

The treatment system of the Hikkaduwa WR treatment Facility is Natural pond system, combination of preliminary treatment, secondary treatment, and disinfection. The capacity of the sewerage system is 1100 m^3/day.

The sludge deposited on the pond bed and is removed buried / abounded land using VTUs when pond 1 filled with sludge and solid waste is burnt in a pit. The system map of the aforementioned activities is described in **Figure 7** including the identified wastes generated by the system operations.

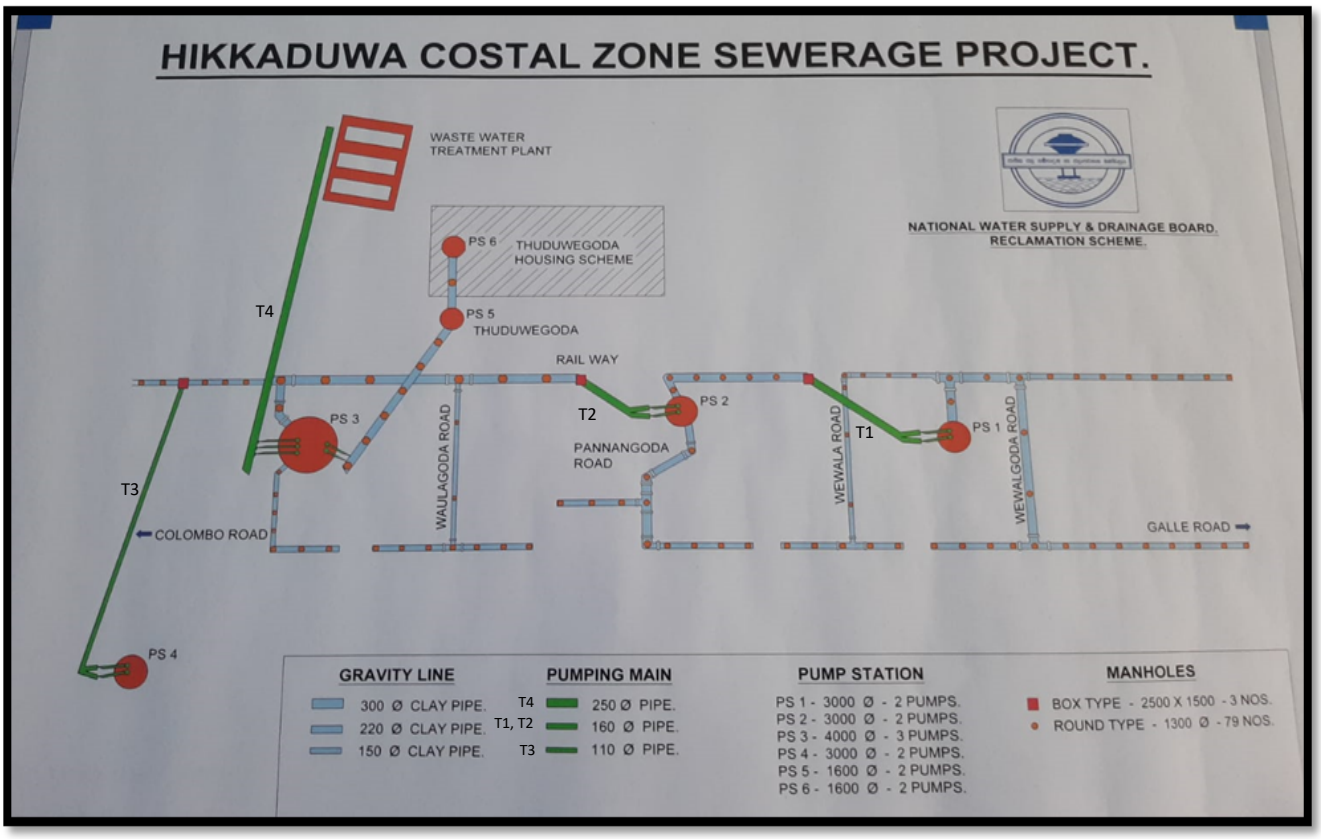


Figure 7: System Layout

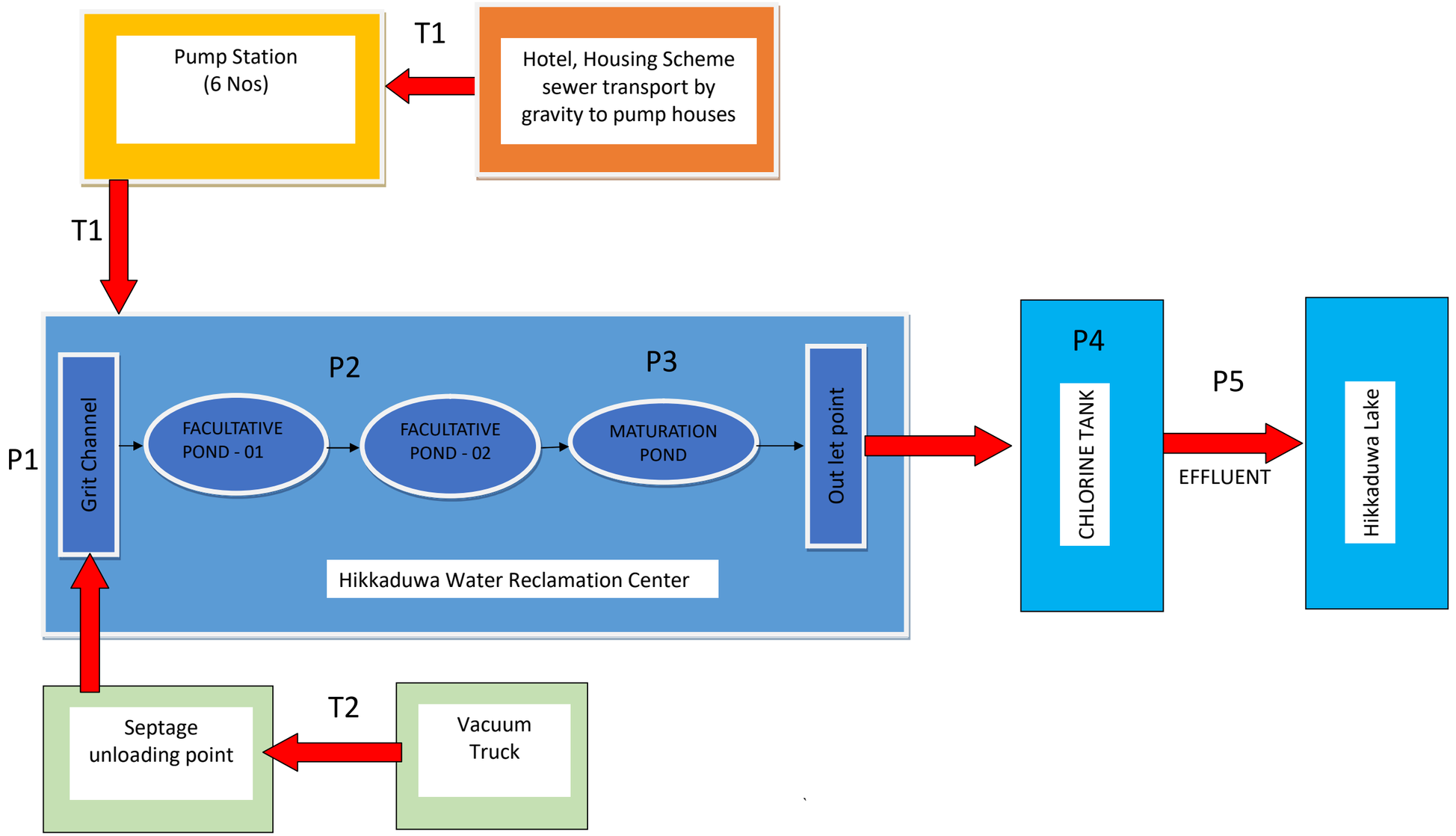


Figure 5: System Map

2.1.1. Septage and Sewerage Treatment

The waste water flows through sewerage pipes to pumping stations under gravity flow. Since the collection to pump stations is free from human engagement, the risk of exposure to raw septage during collection is very unlikely. However, there can be situations of negative flow and the consumers can experience a raw septage flowing back to the houses. To prevent that raw water levels are monitored real time at pump stations and pumped the excess raw water to STP or another pump station. (PS 2)

During septage collection, both customers and sanitation workers may be exposed to pathogens and helminths risks either through dermal contact or inadvertent ingestion. Inhalation of fumes is also possible and may cause unease to customers and sanitation workers. The same risks may also be present during overflow of sewer lines, sewer service connection or sewer manhole.

[T1, T2] Sewer Lines

Sewer network of Hikkaduwa WR expands for 5 kilometers. Wastewater generated at consumers flow under gravity to sewer manholes which connected to a Pumping Station (PS).

Hikkaduwa Sewerage System consists of 6 pump stations as shown in Figure 2. The pumps stations consists of underground sump, pump house, a generator room (optional) and a screen filters if the PS is located in a sump well

The influent is collected in underground sumps. The raw water levels are monitored using sensors and reported real time to the STP. When the raw water level rises and the STP requires more time for the treatment process, the pump stations automatically pumps the water to the nearby pump PS to maintain the water levels. In case of all the pump stations and the STP are unable to accept the excess water from other pump stations

Wastewater Treatment

Wastewater is accepted by the treatment plant for stabilization and treatment in order to comply with National Environmental standards. The treatment process is composed of 3 major components; (i) Pretreatment, (ii) Treatment, and (iii) Disinfection.

i. P1 - Pretreatment

Screening: The screen is designed to remove solids greater than 25 mm. The screenings are manually collect. This reduces the volume of screening and the organic matters are washed out from the screenings and get back into the wastewater flow.

Grit removal: Grit is removed. The settled grit is transported to containers and disposed.

Oil Grease removal: The grease is removed to avoid non aesthetic conditions caused by the volatile organics and malodorous floating sludge. The grease is scraped off to the grease collector and pumped to the container.

In normal operation the incoming water flows completely to the compact unit and both units operate simultaneously. In case of failure of one compact unit an alarm occurs and automatically switched off.

ii. P2, P3 - Treatment

The pretreated water is led directly into stabilization pond system consist of 2 Facultative Ponds and 1 maturation ponds

Facultative Ponds: The Facultative Ponds -1 receives the effluent from pretreatment units along the long sides of the pond. After 2 weeks, cleared water is then transferred to the Facultative Ponds 2
.

Maturation pond: Downstream the Facultative Pond -2 the pre treated effluent is flow gravity in to maturation pond. In normal loading conditions retention time of maturation ponds at least about 2 weeks. The retention time for maturation

pond is chosen to be at least 1 day period at maximum flow situation with removal efficiency of 85%.

The treated of effluent from maturation pond is flown under gravity to the disinfection unit.

iii. P4 - Disinfection

To achieve the effluent requirements regarding fecal bacteria, the biologically treated effluent is disinfected by dosing sodium hypochlorite. The cleared effluent then transferred to holding for chlorine application.

The chlorination dosage is controlled by the flow measurement and the residual chlorine instrument. NaOCl solution is prepared within the plant by adding 4 kg bag of NaOCl to the tank and filling water up to a pre-marked level. Sanitation workers can be exposed to concentrate NaOCl while adding bulk to dosing tank.

Figure 6 : Manual Disinfection

The sludge collected in pump houses are done in manually and removed within 2-3 years using Gully Sucker.

Figure: Pump house Manual Cleaning

Throughout the treatment, there are various waste streams that can cause potential hazards such as the collected septage during sewer manhole declogging, solid wastes from the wastewater and used oil from the VTUs.

Removal of Solid Waste in Pump well

Solid waste, oil and grease contain in wastewater are not separated in and collect to containers. Screenings collected are burnt in a pit within the plant premises. Collected oil and grit are disposed to a pit dug in the ground.

Removal of Sludge of Facultative ponds

When the scum is floated over the facultative pond -01, it is collect sludge from Gully Suckers and transport to uncultivated land for sanitary land filling. (4-5 year of period)

Periodically Transmission line including collection network is clean from using gully sucker jetting machine. Once a year distribution and transmission lines are cleaned by using water jet.

P5 - Effluent

The treated effluent is then discharged to the Thotagamu ela . The effluent discharge location is located downstream to the above location and the effluent is regularly monitored to ensure that it complies with the legal requirements for effluent discharge *(see Section 2.4)*

Figure: Discharging effluent

Table 4 . Sewage Treatment Plant Components

Code	Equipment/Process	Purpose	Waste Streams and Potential Hazards
T1	Sewer System	Sewer system allows wastewater from households to flow in to the treatment system	Exposure to sewerage while cleaning the system.
T1	Pumping stations	Sewerage flows under gravity to the pumping stations. The pump stations collect the water in a sump and pump to the treatment plant	Exposure to raw sewerage while maintenance
T2	Vacuum Truck Unit (VTU) (3rd Party)	Equipment that collects and transports septage from customer's septic tank to the treatment plant. This is equipped with vacuum pumps that siphons the accumulated septage from the septic tank, and store it temporarily in the holding chamber of the truck.	Exposure to raw septage leaks, used oil from VTUs and unsanitized house effluents may cause pathogen-related and helminth-related risks especially during desludging.
P1	Grit Trap	The Grit Trap provides maximum separation of heavy mineral solids while rejecting lighter organic solids, which remain in the wastewater flow.	Collected Grit / sand
P2	Facultative Pond	Allow wastewater to mix with atmospheric air and aerobic bacteria to digest the organic material in sewerage.	Exposure to sewerage while collecting samples
P3	Maturation Pond	Maturation ponds allow for further clarification of biologically treated wastewater.	Exposure to sewerage
P4	Chlorine Tank	Homogenously mix the applied chlorine with the effluent to effectively disinfect the effluent before disposal to the receiving bodies of water. This is used to address the total coliform in the treated effluent.	Chlorine solution (in case of spillage)

Code	Equipment/Process	Purpose	Waste Streams and Potential Hazards
P5	Discharge of treated Effluent lines	Treated and environmentally compliant by-product of Removal of obstructions inside the main sewer pipe lines	No waste stream Exposure to raw wastewater; inadvertent ingestion, inhalation & skin infection
P1-D	Declogging of sewer manholes	Removal of obstructions inside the sewer manholes	Exposure to raw wastewater; inadvertent ingestion, inhalation & skin infection
P1-D	Cleaning of sewer lines	Removal of accumulated debris, sand and grits inside the sewer pipe lines to avoid future cloggings	Exposure to raw wastewater; inadvertent ingestion, inhalation & skin infection
P1-A & P1-D	Sewer rods/Drain cleaning machine for declogging	Used for declogging of sewer lines and sewer service connections	Exposure to raw wastewater; inadvertent ingestion, inhalation & skin infection
T2	Vaccum truck for declogging	Used for declogging of sewer manholes	Exposure to raw wastewater; ingestion, inhalation & skin infection

Hikkaduwa Local Authority's Septage Treatment Plant

The system starts from households where wastewater is generated that serviced by VTUs. The capacity of the sewerage system is 30 m^3/ day.

The sludge cake is sold as fertilizer and the treated effluent is used to wet the solid waste to support decomposing. The system map of the aforementioned activities is described in **Figure 15.**

Figure 7 : System Map of Hikkaduwa LA's STP

[T1, T2] Septage Collection

Hikkaduwa Local Authority manages a separate STP that receives the septage from Hikkaduwa , Rathgama , Boossa, Galle, Karapitiya, Baddegama, Gonapinuwala, Ambalangoda and Elpitiya areas. Customers are mostly the households and hotels of the above area.

Hikkaduwa Local Authority owns a 4m^3 and 2 m^3 capacity VTUs and provides the service on request. Average of 3-4 loads per month receives to the treatment plant for treatment.

[P3] Septage Treatment

Treatment is done by waste stabilization pond system as shown in Figure 14. Septage is unloaded to the receiving tank followed by two settling tanks. Effluent is directed to the treatment pond through a V notch. Treatment plant capacity is around 30 m^3.

[P5] Treated Effluent

Treated effluent is led to existing leachate collection pit to be reused to hydrate the compost piles of solid waste treatment plant.

Seasonal Variation

During Hikkaduwa tourist season more than 100,000 foreigners visit Hikkaduwa Tourists Area. During This period heavy flow passes through the system. And pumps capacity not adequate the flow it may be overflow from manholes and block were occur in distribution network.

2.2 Waste Characteristics

Upon completion of the system maps for each of the sanitation steps and based on the results of the characterization, the SSP Team initially identified the potential health hazards. **Table 3** shows the summary of the wastes generated in the STP and the associated potential health hazards. The significant hazards are marked with across the waste fraction identified.

Table 3 :. Waste Characterization and Potential Health Hazards

	Biological Hazards					Chemical Hazards		Physical Hazards		
Component	Viruses	Bacteria	Protozoa	Helminths	Vector relateddiseases	Toxicchemicals	Heavy metals	Sharp objects	Inorganic material	Malodours
A. Septage and Sewage										
Diluted Excreta	√	√	√	√					√	√
Urine (human)	√	√	√	√						√
Solid Waste	√	√	√	√	√			√	√	√
FOG (from domestic)	√	√	√ √	√					√	√
B. End Products (after Treatment)										
Effluent	√	√	√ √	√						
Biosolids	√	√	√ √	√	√		√		√	√
Hazardous Wastes						√	√	√	√	

Influent

The characteristics of the domestic wastewater (sewage), septage and the influent to the secondary treatment are shown in **Table 4**. These values will undergo treatment to comply with the prescribed limits discharge of wastewater or effluent into Inland Surface Waters.

Table 4 Summary of Influent Stream Characteristics in

Parameters	Influent to Secondary Treatment	The National Environmental Act
Biochemical Oxygen Demand, mg/l BOD5	350	<30 mg/L
Chemical Oxygen Demand, mg/l COD	450	<250 mg/L
Total Suspended Solids, mg/l TSS	270	50
Oil and Grease, mg/l	n/a	10
pH	7.0 - 8.0	6.0 – 8.5
Total Coliform, MPN/100 mL	-	<150
Residual Chlorine	n/a	0.5 mg/L (min)

Effluent and End-Products

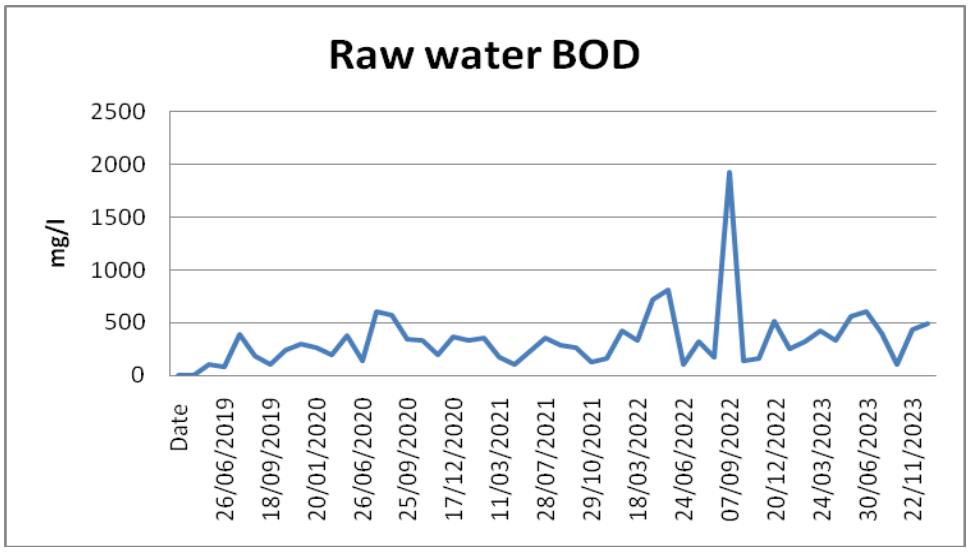
Hikkaduwa STP's wastewater samples are collected and analyzed at the in-house Process Laboratory located within the facility. Influent and effluent from the sewage treatment plant and raw septage and filtrate samples from the septage treatment plant are subject for weekly analysis on the following parameters:

- Biochemical Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)
- Total Suspended Solids
- pH
- Temperature

Biosolids produced from the septage treatment plant are subjected for the moisture content analysis. In addition, analysis for risk factor as soil conditioner is included in the verification monitoring plan.

The wastewater effluent characteristics are also tested monthly for compliance and reporting to regulatory office/s.

In terms of compliance, Hikkaduwa STP consistently conforms to the National Environmental Act effluent standards for the discharge of wastewater or effluent into Inland Surface Waters **(Figures 11 to 14)**. Regular proactive monitoring of wastewater quality is conducted to ensure environmental compliance.



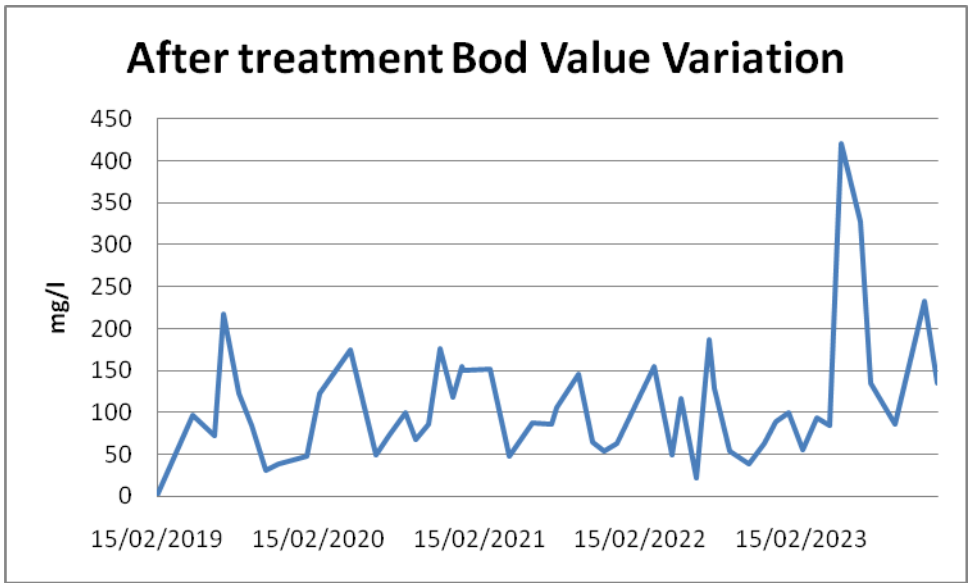


Figure 8: Monthly BOD Levels for Influent and Effluent

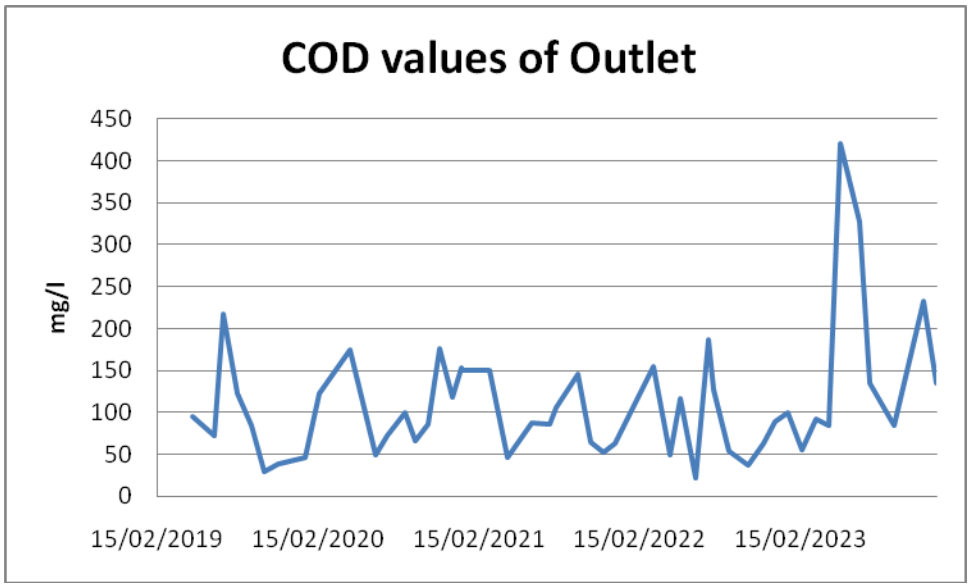


Figure 9: Monthly COD Levels for Influent and Effluent

2.3 Validation of Data

Sewer Network Validation

Field investigation is conducted to validate the conditions of the sewer network in the Hikkaduwa Sewerage treatment facility. A walk-the-line inspection of the 8km of sewer line and 83 manholes are carried out by the maintenance personnel to see if there are infiltrations, damage and clogging into the system. Preventive maintenance of the sewer network is carried out every year to ensure and maintain reliability and efficiency of the system (Requires desludging). Accounts not connected are inspected for possible interconnection to the system while those that cannot be connected are scheduled for the desludging program.

Old pipe network used in the town area has practical problems in validation. Permanent structures like houses are built on top of the manholes of sewer network making it difficult to maintain the system.

PH meters used in the plant are calibrated yearly. Other equipment used to measure influent and effluent parameters and sensors used to monitor online are not calibrated in a routine process at the moment.

Biosolids Handling

Biosolids generated at the Septage Treatment Plant is kept within the plant area and used as fertilizer to the plants grown within premises.

2.4 Compliance to Legal Requirements and Other Relevant Information

The Hikkaduwa wastewater treatment system complies with the National Environmental (Protection and Quality) Regulations, No. 1 of 2008 published in the Gazette Extraordinary No. 1534/18 of February 1, and the amendments.

MODULE 3

IDENTIFICATION OF HAZARDOUS EXPOSURE EVENTS, ASSESSMENT OF EXISTING CONTROL MEASURES AND EXPOSURE RISKS

3. IDENTIFICATION OF HAZARDOUS EXPOSURE EVENTS, ASSESSMENT OF EXISTING CONTROL MEASURES AND EXPOSURE RISKS

Specifying each step in the system is essential in determining potential hazards and hazardous exposure events for the exposure groups. This leads to the assessment of the risks and the extent at which these are controlled. The result of this step in the SSP is to ensure that subsequent efforts and investments on the system monitoring and improvements respond to actual rather than perceived health risks.

3.1 Identification of Hazard and Hazardous Exposure Events

The hazards and hazardous exposure events are identified for the different processes in the system (sewage collection, septage collection, treatment of septage, handling of biosolids, processing of biosolids into vermicast and fleet maintenance). **Table 5** shows these identified hazards and hazardous exposure events. This helps in identifying who may be placed at risk and how the exposure risk occurs. Also included in Table 12 are the existing controls, validation of control, exposure groups, likelihood, severity, risk score and risk rating.

3.2 Identification of Exposure Groups and Exposure Routes

Identified hazard and hazardous exposure events must be related to its corresponding exposure groups and the routes by which these groups may be affected. For the Hikkaduwa WWTP, a total of eleven (11) exposure groups with four groups considered as external and the other five as internal (or within MWSI). Below is the list of exposure groups and its corresponding code.

Exposure Group	No. of personnel
Utilize downstream water (U1)	0
Consumers / Households (U2)	10
Third-party biosolids Handlers (U4)	-
Sanitary labors (W1)	7
VT operators (W2)	14
Plant operators (W3)	0
Plant monitoring team (W4)	2
Farmers who use compost made of bio solids (F1)	0
Local Community in possible spillage area. (L1)	0

3.3 Identification and Assessment of Existing Control Measures

For each of the hazard exposure event identified in Table 5, SSP team identified existing control measures to mitigate the risk of such hazardous exposure events. The said control measures were then assessed on their effectively in reducing the risk of the exposure event.

The risks were assessed based on its likelihood and severity as shown on **Table 6**. The computed level of risk and likelihood equates to the ranking of risks as shown in **Table 7** wherein the risk level was identified. Furthermore, the risk category is described in **Table 8** to highlight the actions to be taken upon assessing the risk.

3.4 Assessment and Prioritization of the Exposure Risks

Due to the large number of identified hazards and hazard exposure events in the previous section, not all of them will be addressed immediately due to limited resources available. The team evaluated the risk rating of each before considering those that need immediate action plan and those that can be planned in the future. Most of the items prioritized by the team are those with high-risk rating.

Table 5: Hazard Identification and Risk Assessment for Hikkaduwa Wastewater Treatment System

	Sanitation Step	Hazard Identification			Existing controls	RISK ASSESSMENT Allowing for the existing control L=Likelihood; Se=Severity; Sc=Score; R=Risk Level					
		Hazardous Exposure Event	Hazard Type	Exposure Route	Description of existing controls	Validation of control	Exposure group	L	Se	Sc	R
1	Consumer (Domestic/Commercial)	lack of knowledge in waste water handling	Exposure to raw septage	Skin Contact, ingestion	No existing control measures at present	conducting	Consumer	3	8	24	H
2		Adding excessive amount of oil and grease to the system	Effluent containing oil and grease level more then required.	Effluent mixed with oil		Customers are advise to Introducing oil & greese traps. Awareness programs	U1	5	2	10	M
3		Adding Chemical Detergent to the system	Effluent containing Detergent Toilet cleaning chemicals, soap etc.	Effluent mixed with Chemicals	No existing control measures at present	awareness programs	Plant	5	2	10	M
4		Un sealed or loose Manhole cover	Animals and large garbage can enter the system	Falling through the manhole	sealing or replacement	Replacing & repairs manholes covers from RH budget	animals	5	2	10	M
5		Un sealed or loose Manhole cover	Entering Rainwater to manhole	Dilute and overflow sewer water	Manhole cover sealed or fit	Replacing & repairs manholes covers from RH budget	Consumer	4	2	8	M
6		Un sealed or loose Manhole cover	Large scale Garbage	Accumulation of garbage in pipe line and collecting center	No existing control measures at present	Replacing & repairs manholes covers from RH budget		5	2	10	M

	Sanitation Step	Hazard Identification			Existing controls	RISK ASSESSMENT Allowing for the existing control L=Likelihood; Se=Severity; Sc=Score; R=Risk Level					
		Hazardous Exposure Event	Hazard Type	Exposure Route	Description of existing controls	Validation of control	Exposure group	L	Se	Sc	R
7	Screnning point of pumping Stations	Exposure to raw sewage during opening of sewer trunk main	Pathogens in raw septage	Skin contact	Screening available	Use of safety equipments, Vaccination & awareness programs	W1	2	3	6	M
			Malodors	Inhalation		Wearing face mask		3	2	6	M
8		Exposure to raw sewage during desludging of garbages	Pathogens in raw sewer	Skin contact		Use of safety equipments	W1	2	2	4	L
	Septage Transportation										
9	Piped sewer	Leakage of sewer to ground	Pathogens in raw septage	Contamination with ground water	Regular inspections & leak repairs	Routine inspection/ Inspection Report	L6	1	4	4	L
10		Rain water seep in to the man holes	Overflowing of manholes and pump stations	Skin contact	No existing control measures at present	Increasing pump capacity	U1, U2, L1	4	2	8	M
11		Overflowing of pump stations and manholes due to unauthorized unloading VTUs to the sewer manholes	Pathogens in raw septage	Skin contact	No existing controls	Provide manholes with locks	U1, U2, L1	1	8	8	M

	Sanitation Step	Hazard Identification			Existing controls	RISK ASSESSMENT Allowing for the existing control L=Likelihood; Se=Severity; Sc=Score; R=Risk Level					
		Hazardous Exposure Event	Hazard Type	Exposure Route	Description of existing controls	Validation of control	Exposure group	L	Se	Sc	R
12	Pump stations	Overflow of pump stations directed to the rainwater cannals	Pathogens in raw septage	Contamination of surface water	Incresing pumping from pump stations to the treatment plant.	Real-time monitoring	U1,L3	2	8	16	H
13		Poor security	increase unauthorized enering	Peoples	damaged fences	Real-time monitoring Increasing pump capacity		2	4	8	M
14		Leakage of sewerage to ground	Pathogens in raw septage	Contamination with ground water	Regular inspections & leak repairs	Routine inspection/ Inspection Report Repair the leak	L6	1	2	2	L
15		Rain water seep in to the man holes	Overflowing of manholes and pump stations	Skin contact	No existing control measures at present	Increasing pumping capacity	U1, U2, L1	4	2	8	M
16		Overflowing of pump stations and manholes due to unauthorized unloading to the sewerage manholes	Overloading	Damage to the structures and equipment	Real time monitoring	Provide manholes with locks.	U1, U2, L1	1	8	8	M

	Sanitation Step	Hazard Identification			Existing controls	RISK ASSESSMENT Allowing for the existing control L=Likelihood; Se=Severity; Sc=Score; R=Risk Level					
		Hazardous Exposure Event	Hazard Type	Exposure Route	Description of existing controls	Validation of control	Exposure group	L	Se	Sc	R
17	Pump stations	Overflow of pump stations directed to the canals	Pathogens in raw septage	Contamination of surface water	More frequent pumping from pump stations to the treatment plant.	Real-time monitoring Increasing pump capacity	U1,L3	2	4	8	M
18		Damaged to the level sensors radio signals which communicate the water levels of pump stations to the STP causing overflow of PSs.	Incorrect reading of levels	Contamination of surface water	No existing control measures at present	Increasing pump capacity	U1	3	4	12	M
19		Exposure to raw septage during opening of pump well	Pathogens in raw septage	Skin contact	Vaccination for hepatitis & anti-tetanus	Vaccination Record	W1	3	4	12	M
20			Malodors	Inhalation	Strict implementation of safety and hygiene practices	small barriers visual inspection		3	8	24	H
21		Exposure to raw sewage during maintenance	Pathogens in raw septage	Skin contact	Use safety equipments such as boots and gloves. .	Improving safety measures validation	W1	4	4	16	H
			Malodors	Inhalation							

	Sanitation Step	Hazard Identification			Existing controls	RISK ASSESSMENT Allowing for the existing control L=Likelihood; Se=Severity; Sc=Score; R=Risk Level					
		Hazardous Exposure Event	Hazard Type	Exposure Route	Description of existing controls	Validation of control	Exposure group	L	Se	Sc	R
22	Pump stations	Falling down due to Ladder chemical anchoring is loosen	Falling down	Physical injuries	No existing control measures at present	Repairing ladders structures	W1	2	8	16	H
			Pathogens in raw septage	Skin contact							
				Ingestion							
23		Falling down due to unbalance or loss of grip	Falling down Pathogens in raw septage	Physical damages Skin contact Ingestion	No existing control measures at present	improved awareness and mindfulness	W1	2	8	16	H
24		Leakage of gasses to surrounding	Malodors	Skin contact	In built chimneys to release gasses to higher levels.	Vegetation covers & smell barriers	L2	1	2	2	L
25		Leakage of gasses without filtration due to malfunctioning of bio filters	Malodors	Ingestion	No existing control measures at present	N/A	L2	3	2	6	M
26		Leakage of current due to animals (rats) damage the wires	Current	Body contact	Existing conduits to be replaced with metal conduits.	Reroute the wires through more open areas Visual inspection	W1, W3, W4	1	16	16	H

	Sanitation Step	Hazard Identification			Existing controls	RISK ASSESSMENT Allowing for the existing control L=Likelihood; Se=Severity; Sc=Score; R=Risk Level					
		Hazardous Exposure Event	Hazard Type	Exposure Route	Description of existing controls	Validation of control	Exposure group	L	Se	Sc	R
27	Transport of Septage through Gully Bowser	Exposure to raw septage due to spillage during vehicular accident	Pathogens in raw septage	Skin contact	Currently not functioning.	Awareness	W3, L6	2	2	4	L
			Malodors	Inhalation							L
28		Exposure to raw septage due to spillage during loose fittings	Pathogens in raw septage	Skin contact		Visual inspection	L6	2	2	4	L
			Malodors	Inhalation							L
	P2 Treatment of Raw Septage										
29		Exposure to raw septage due to leak during pumping to the preliminary treatment unit (Screning)	Pathogens in raw septage	Skin contact	Clean up procedure for spilled material	Routine inspection/ Inspection Report	W1, W3	2	2	4	L
			Malodors	Inhalation							
30		2. Exposure to raw septage due to contact to residue during maintenance and repair activities	Pathogens in raw septage	Skin contact	Strict implementation of safety and hygiene practices	Visual inspection Strictly adhere to safety measures	W1	4	2	8	M
			Malodors	Inhalation							
31		Exposure to raw septage due to animals removing the covers of preliminary treatment unit	Pathogens in raw septage	Skin contact	Clean up procedure for spilled material Fixing covers safety measures	Strictly adhere to safety measures	W1	3	2	6	M
			Malodors	Inhalation							

	Sanitation Step	Hazard Identification			Existing controls	RISK ASSESSMENT Allowing for the existing control L=Likelihood; Se=Severity; Sc=Score; R=Risk Level					
		Hazardous Exposure Event	Hazard Type	Exposure Route	Description of existing controls	Validation of control	Exposure group	L	Se	Sc	R
32		Exposure to screened trashes due to contact during transfer to burning pit	Pathogens in raw septage Malodors	Skin contact Inhalation	Safety practices	Visual Inspection	W1	3	1	3	L
33		Exposure to removed grit due to contact during transfer to disposal	Pathogens in grit	Skin contact	Safety practices. i.e.: Using gloves and mask	Awareness Visual inspection Strictly adhere to safety measures	W1	3	1	3	L
34		Exposure to removed oil and grease due to contact during transfer to disposal	Pathogens in oil and grease	Skin contact	Safety practices. i.e.: Using gloves and mask	Awareness Visual inspection Strictly adhere to safety measures	W1	3	1	3	L L
35		Exposure to cleaning of screening	Pathogens in pre-treated effluent	Pathogens in pre-treated effluent	Safety practices. i.e.: Using gloves and mask	Awareness Visual inspection Strictly safety measures	W1	3	2	6	M
36		Accidental falling into tank during operation, monitoring and maintenance	Physical injury Pathogens in raw septage	Physical injury Skin contact Ingestion	Installed a guard rail in the areas of sample collection safety measures	Awareness Visual inspection Strictly adhere to safety measures	W1, W3, W4	2	4	8	M

	Sanitation Step	Hazard Identification			Existing controls	RISK ASSESSMENT Allowing for the existing control L=Likelihood; Se=Severity; Sc=Score; R=Risk Level					
		Hazardous Exposure Event	Hazard Type	Exposure Route	Description of existing controls	Validation of control	Exposure group	L	Se	Sc	R
37	A. Secondary Treatment	Attack or injury by the Bird and animals live in sewerage pond	Physical Injury	Physical Injury	A request is made to the department of wildlife conservation to remove the animal	N/A	W1, W2, W3, W4, L2	2	16	32	H
38		Exposure to pre-treated effluent due to contact during collection of sample	Pathogens in pre treated water	Skin contact	Safety practices. i.e.: Using gloves and mask	Awareness Visual Inspection Strictly adhere to safety measures	W1, W3	2	2	4	L
39		Accidental falling into ponds during operation, monitoring and maintenance	Pathogens in pretreated water	Skin contact Ingestion	No existing control measures at present	Awareness Visual Inspection Strictly adhere to safety measures	W1	2	4	8	M
40		Exposure to pre-treated effluent due to contact during cleaning of ponds	Pathogens in pretreated effluent	Skin contact	Safety practices. i.e.: Using gloves and boots	Awareness Visual Inspection Strictly adhere to safety measures	W1	3	4	12	M
41		Exposure to pre-treated effluent due to contact during inspection and monitoring of operation	Pathogens in pretreated effluent	Skin contact	Safety practices. i.e.: Using gloves and mask	Awareness Visual inspection Strictly adhere safety measures	W1, W3	2	2	4	L

	Sanitation Step	Hazard Identification			Existing controls	RISK ASSESSMENT Allowing for the existing control L=Likelihood; Se=Severity; Sc=Score; R=Risk Level					
		Hazardous Exposure Event	Hazard Type	Exposure Route	Description of existing controls	Validation of control	Exposure group	L	Se	Sc	R
42	Discharge treated waste water	Exposure to high clorine dosage	Living organism in canal can be death	Physical injury, Skin contact,Ingestion	Check RCl 2 in intervals	Testing of RCl frequently		2	4	8	M
43		No or Law RCl in discharge water	Can be in Pathogen	Physical injury, Skin contact,Ingestion	Check samples for Bacteria	Awareness and mindfulness		2	2	4	L
44		contaminated water Discharge natural water tanks	Can be in Pathogen and high chemicals	Physical injury,Skin contact,Ingestion	Check samples for BOD.COD	Visual inspection awareness		2	2	4	L
45		death of fauna and flora of natural water body	Can be in Pathogen and high chemicals	Physical injury,Skin contact,Ingestion	Check samples for BOD.COD	Frequent checking of RCL maintaining cholrine levels		2	2	4	L
46		Can be alergy to fish and animal living near the plant	Can be in Pathogen and existing of pathogen high chemicals	Physical injury,Skin contact,Ingestion	Check samples, visit near by plant primises	Frequent checking of RCL maintaining cholrine levels		2	2	4	L

	Sanitation Step	Hazard Identification			Existing controls	RISK ASSESSMENT Allowing for the existing control L=Likelihood; Se=Severity; Sc=Score; R=Risk Level					
		Hazardous Exposure Event	Hazard Type	Exposure Route	Description of existing controls	Validation of control	Exposure group	L	Se	Sc	R
47	Discharge Sluge	Can be infected when use as a fertilizer	Existence of Pathogens	Physical injury,Skin contact,Ingestion	Check sludge samples	awareness for farmers	U4,F1,L1	2	2	4	L
48		Can be contaminated water bodies and Ground water	Existence of pathogens	Physical injury,Skin contact,Ingestion	Check sludge samples	awareness for farmers	U4,F1,L2	2	2	4	L
	Waste handeling										
49	De-sludging	Exposure to sludge while manual de-sludging	Pathogens in sludge	Skin contact	Safety practices. i.e.: Using gloves and boots	Visual inspection & awareness	W1	4	2	8	M
50	Sludge cake draining	Exposure to sludge cake due to contact during transfer from catchment at dewatering machine to the sludge draining area	Pathogens in sludge cake	Skin contact	Safety practices. i.e.: Using gloves and boots	Visual inspection & awareness	W1	4	2	8	M
			Malodors	Inhalation	Safety practices.						

Table 6 : Definition for Likelihood and Severity for Risk Ranking

	Descriptor	Description
Likelihood (L)		
1	Very Unlikely	Has not happened in the past and it is **highly improbable** it will happen in the next 12 months (or another reasonable period)
2	Unlikely	Has not happened in the past but **may occur in exceptional circumstances** in the next 12 months (or another reasonable period)
3	Possible	May have happened in the past and/or **may occur under regular circumstances** in the next 12 months (or another reasonable period)
4	Likely	Has been observed in the past and/or is **likely** to occur in the next 12 months (or another reasonable period).
5	Almost Certain	Has often been observed in the past and/or **will almost certainly occur** in most circumstances in the next 12 months (or another reasonable period).
Severity (S)		
1	Insignificant	Hazard or hazardous event resulting in **no or negligible health effects** compared to background levels.
2	Minor	Hazard or hazardous event potentially resulting in **minor health effects** (e.g. temporary symptoms like irritation, nausea, headache).
4	Moderate	Hazard or hazardous event potentially resulting in a **self-limiting health effects or minor illness** (e.g. acute diarrhoea, vomiting, upper respiratory tract infection, minor trauma).
8	Major	Hazard or hazardous event potentially resulting in **illness or injury** (e.g. malaria, schistosomiasis, food-borne trematodiases, chronic diarrhoea, chronic respiratory problems, neurological disorders, bone fracture); and/or may lead to legal complaints and concern; and/or major regulatory non-compliance.
16	Catastrophic	Hazard or hazardous event potentially resulting in **serious illness or injury, or even loss of life** (e.g. severe poisoning, loss of extremities, severe burns, , drowning); and/or will lead to major investigation by regulator with prosecution likely.

Table 7 Risk Matrix for Risk Ranking

			SEVERITY (S)				
			Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
			1	**2**	**4**	**8**	**16**
LIKELIHOOD (L)	Very unlikely	**1**	1	2	4	8	16
	Unlikely	**2**	2	4	8	16	32
	Possible	**3**	3	6	12	24	**48**
	Likely	4	4	8	16	32	**64**
	Almost Certain	**5**	5	10	20	**40**	**80**
Risk level			**Low Risk**	**Medium Risk**		**High Risk**	**Very High Risk**

Table 8 :Risk Category Description for Team Based Descriptive Risk Assessment

RISK DESCRIPTOR	NOTES
Very High and High Risk	Actions need to be taken to minimize the risk. Possible options (short, medium and long term options) should be documented (as part of the improvement plan developed in the next Module) and implemented based on priorities and available resources.
Medium Risk	Currently low or very unlikely impact on exposure groups. The situation can be improved with operational changes or system improvement over the medium to long term.
Low Risk	Actions may be taken but not a priority, or no action is needed at this time. The risk should be revisited in the future as part of the review process.
Unknown priority	Further data is needed to categorize the risk. Some action can be taken to reduce risk while more data is gathered.

MODULE 4

DEVELOPMENT AND IMPLEMENTATION OF AN INCREMENTAL IMPROVEMENT PLAN

4. DEVELOPMENT AND IMPLEMENTATION OF AN INCREMENTAL IMPROVEMENT PLAN

In order to ensure that hazards and hazard exposure events with high-risk ratings are properly addressed an improvement plan has been established and this is reflected in **Table 9**.

No.	HAZARDOUS EXPOSURE EVENT	IMPROVEMENT/ ACTIONS (New Improved Control Measure)	PRIORITY (High, Medium, Low, unknown)	RESPONSIBLE AGENCY/ PERSON	ESTIMATED COST	STATUS
	Septage Transportation					
7	Overflowing of pump stations and manholes due to unauthorized unloading VTUs to the sewer manholes	Provide with locks to the manhole covers	High	NWS&DB		Procured
	Pumping					
11	Exposure to raw septage during opening of septic tank	Provide safety equipment	High	NWS&DB		Procured
12	Exposure to raw septage during maintenance	Provide with PPE to the sanitation workers	High	NWS&DB	-	Procured
13	Falling down due to Ladder chemical anchoring is loosen	Use a safety belt when climbing down to the sump	High	NWS&DB	-	Procured
14	Falling down due to unbalance or loss of grip	Use a safety belt when climbing down to the sump	High	NWS&DB	-	Procured
17	Leakage of current due to animals (rats) damage the wires	Provide metal conduit for wires	Very High	NWS&DB	-	Procured
	Secondary Treatment					
	Disinfection					
37	Falling in while collecting samples		High	NWS&DB	-	Procured

Table 9: NWS&DB development plan

MODULE 5

MONITOR CONTROL MEASURE AND VERIEFICATION OF PERFORMANCE

5. MONITORING OF CONTROL MEASURES AND VERIFICATION OF PERFORMANCE

5.1 Definition and Implementation of Operational Monitoring

NWS&DB Monitoring Plan is presented in **Table 10**.

Table 10: NWS&DB Monitoring Plan

NWS&DB MONITORING PLAN

<table>
<tr><td>Operational Plan For</td><td colspan="4">Monitoring Operational Procedure on Collection, Transport, Treatment of Raw Septage and Sewage, and Disposal of End Products/By-products</td></tr>
<tr><td>Operation Limit</td><td colspan="2">Operational Monitoring of the Control Measure:

Control Measure: Compliance to Operational Procedures, Work Instructions and CEA Guidelines</td><td colspan="2">Corrective Action when the Operational Limit is Not Met</td></tr>
<tr><td rowspan="4">100% Compliance with Operational Procedures, Work Instructions and CEA Guidelines</td><td>What is Monitored</td><td>Practice & Procedure</td><td>What Action is to be taken</td><td>Verbal reminder, issuance of System Improvement Request (SIR) form</td></tr>
<tr><td>How It is Monitored</td><td>Observation, Inspection and Review of Submitted Accomplishment Report</td><td>Who Takes The Action</td><td>On- site Safety Officer
Plant OIC / Supervisor</td></tr>
<tr><td>Who Monitors It</td><td>On-site

Plant OIC/ Supervisor</td><td>When it is Taken</td><td>Within 1 to 3 days</td></tr>
<tr><td>When it is monitored</td><td>Daily plant inspection, on-site inspection, and daily review of accomplishment report</td><td>Who Needs to be Informed of the Action</td><td>AE</td></tr>
</table>

5.2 Verification of System Performance

The NWSDB Verification Monitoring Plan is shown in **Table 11**.

5.3 Auditing and External Assessment of the System

Aside from the compliance of the treatment plant to legal requirements such as submission of Self-Monitoring Report (SMR) and Compliance Monitoring Report (CMR), the site, as part of the WMD, is annually audited by a 3rd party certifying body to verify the effectiveness the operation of its different facilities including the Veterans Water Reclamation Facility. The audit is conducted based on international management system standards as follows: ISO 9001:2008 (Quality Management Systems), ISO 14001:2004 (ISO Environmental Management Systems) and OHSAS 18001:2007 (Occupational Safety and Health Management Systems).

Table 11 NWS&DB Verification Monitoring Plan

SANITATION STEP	VERIFICATION MONITORING				
	WHAT	LIMIT	WHEN	WHO	METHOD OF MONITORING
Effluent Discharge	Quality of Effluent to be dispose at inland water body	CEA Limit	Monthly	NWS&DB – Process Control and Monitoring Of Chemist	Sampling and testing
Sludge removal and sanitary Disposal	Quality of sludge to be disposed	Fertilizer Secretariat Limit	Annually/if need	NWS&DB Process con--trol & mo-nitoring unit	Sampling and testing
Sludge cake Application	Pathogens in soil	Fertilizer Secretariat Limit	Quarterly Quarterly	Central Laboratory Department of Agriculture	Sampling and testing Sampling and testing

SANITATION STEP	VERIFICATION MONITORING				
	WHAT	**LIMIT**	**WHEN**	**WHO**	**METHOD OF MONITORING**
	Chemical contaminants in soil	Soil limits	Quarterly	Department of Agriculture	Sampling and testing
Sludge Application	Farmers health status: % farmers with helminth infection Occurrence of skin infection	Health limits depend on local context and prevailing background data	Annual	PHI	Survey

MODULE 6

DEVELOPMENT OF SUPPORTING PROGRAMS AND REVIEW OF PLANS

6. DEVELOPMENT OF SUPPORTING PROGRAMS AND REVIEW OF PLANS

6.1 Identification and Implementation of Supporting Programs

Supporting programs are organization-wide activities that should be in place in support of mitigating the health effects of wastewater and its by-products. These activities do not directly affect the quality of the wastewater and biosolids but are meant to ensure that no additional source of potential hazards will come from the operating / surrounding environment, the equipment's used and the people themselves, employees and visitors alike. The types of supporting programs that Hikkaduwa WR has in aid of the realization of its mission are provided in **Table 12**. Management commitment entails constant assessment that shall lead to updating of the existing programs and developing new ones.

Table 12: NWS&DB Supporting Programs

Supporting Program	Group Responsible
Conduct of Health Forum for the employees on proper hygiene.	Ministry of Health
Yearly evaluation and accreditation of service providers (for treatment of biosolids)	Local Authority
Review of existing Environment, Safety and Health (ESH) –related operational procedures and work instructions	Central Environmental Authority
Training on Emergency Response, Hazardous Waste Handling and Chemical Handling	Environmental Management Dept., Safety Dept. (Corporate QESH Division)
Annual review of the sanitation and sewerage system	NWS&DB RSC(S) and Water Reclamation Division)

6.2 Periodic Review and Update of the SSP Outputs

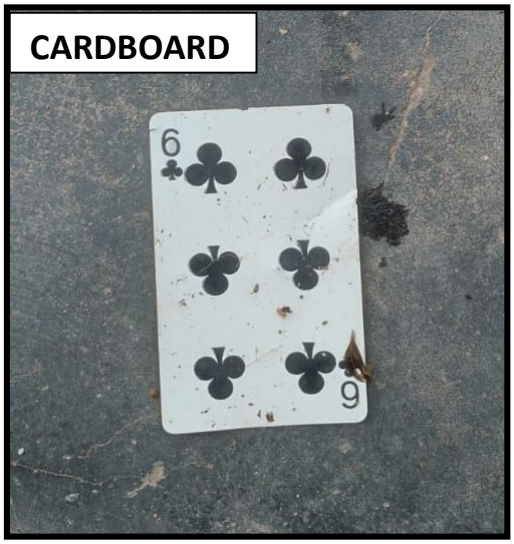
To ensure the SSP covers emerging hazards and issues, the SSP Team shall review it periodically. The implementation of the SSP framework reduces the number and severity of incidents, emergencies or near misses affecting or potentially affecting the health of the workers, users and community. However, such incidents/events may still occur. Hence, in addition to the periodic review of the SSP, review of the SSP following every emergency, incident or unforeseen event irrespective of new hazards will be conducted. This will ensure the same incident/emergency will less likely recur in the future and also to determine whether the response was effective or need to be improved.

The result of a post incident review will identify areas for improvement; whether it is a new hazard, or a revised risk for the risk assessment, a revision for an operating procedure or a training issue. The SSP must be revised to reflect the change and incorporate the lessons learned into the SSP documentation, procedures and supporting programs.

Annex I : Solid waste recycle method at solid waste recycle plant of / Hikkaduwa Rathgama Local Authority.

No	Waste Type	Recycle Disposal method
1	Glass	Crush in the yard and sold to 3rd party buyer.
2	Food Cans	Compressed and sold to third party buyer.
3	Bushy Polythene	Compressed and send to Puttlam Holcium.
4	Plastic	Compressed and send to Puttlam Holcium.
5	Card Board	Compressed and send to Puttlam Holcium.
6	Iron	Sold to third party buyer.
7	Polythene	Compressed and send to Puttlam Holcium
8	Electrical Items	send to Puttlam Holcium
9	Brass	Sold to third party buyer.
10	Beer Cans	Compressed and send to Puttlam Holcium
11	Pet Bottles	Compressed and send to Puttlam Holcium.


SPOON


CARDBOARD


STONES

Annex IIB: Consumer Details

Category Code & Customer Category	S/N	Account No	Name	Addresss
10 - Domestic	1	33/47/115/072/13	SISIL DE ALWIS PANDITHA	NO 371 GALLE ROAD, HIKKADUWA, HIKKADUWA
	2	33/47/115/126/19	HVWD GURUSINGHA	NO 138/A,, WEWALA, HIKKADUWA
	3	33/47/124/074/13	J W SUNENDRA	NO ., AMARASENA MAWATHA, HIKKADUWA
	4	33/47/124/090/13	W.M. LALITHA	NO 06 ,, WELLAGODA, HIKKADUWA
	5	33/47/124/120/17	M K TIUDER	NO 03, FISHERY HOUSING SCHEME, WELLAGODA, HIKKADUWA
	6	33/47/124/175/11	. UPEKSHA GALLAGE	NO 01 , THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	7	33/47/124/176/10	K.P LUXMAN	NO:02, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	8	33/47/124/177/19	D.P HEMAPALA	NO:03, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	9	33/47/124/178/18	P.Y WASANTHA	NO:04, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	10	33/47/124/179/17	H.A. KAMAL JAYANTHA	NO 05, THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	11	33/47/124/180/14	K.P. WASANTHA JANAKA	NO 06 ,THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	12	33/47/124/181/13	M.H SAGARA	NO:07, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	13	33/47/124/182/12	K ANJANA KULASINGHE	NO:8, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	14	33/47/124/183/11	K.K. SANDUN KUMARA	NO:09, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	15	33/47/124/184/10	A.P. ANURA WIJITHA KUMARA	NO 10,THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	16	33/47/124/185/19	W NIMAL	NO:11,THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	17	33/47/124/186/18	E.P RANJANI	NO:12, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA

Category Code & Customer Category	S/N	Account No	Name	Addresss
10 - Domestic	18	33/47/124/187/17	M ARIYAWATHIE	NO:13, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	19	33/47/124/188/16	K.B RANJITH PREMASIRI	NO:14, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	20	33/47/124/189/15	D.S.A SOMASIRI	NO:15, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	21	33/47/124/190/12	K.G CHANDRASIRI	NO:16, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	22	33/47/124/191/11	A SOMINONA	NO:17,THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	23	33/47/124/192/10	W.N.R.P DAYANANDA	NO:18, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	24	33/47/124/193/19	M.S RAJU	NO:19,THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	25	33/47/124/194/18	D.P SURANGA	NO:20, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	26	33/47/124/195/17	W. PREMALAL	NO:21, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	27	33/47/124/196/16	K.M SHIRANI	NO:22, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	28	33/47/124/197/15	W.D LASITHA CHAMINDA	NO:23, THUDUWAGODAWALA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	29	33/47/124/198/14	H.G.G UPUL WASANTHA	NO:24, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	30	33/47/124/199/13	M NANDASENA	NO:25, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	31	33/47/124/200/10	R KULASINGHA	NO:26, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	32	33/47/124/201/19	H.M SENAVIRATNA	NO:27, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	33	33/47/124/202/18	U.M LIONEL	NO:28, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	34	33/47/124/203/17	G M MANUSHA CHANDANI	NO:29, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	35	33/47/124/204/16	W.A LAL NISHANTHA	NO:30,THUDUWAGODAWALA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA

Category Code & Customer Category	S/N	Account No	Name	Addresss
10 - Domestic	36	33/47/124/205/15	A AJITH PRIYANTHA	NO:31, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	37	33/47/124/206/14	P.Y. SANKA KRISHNTHA	NO 32 , THUDHWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	38	33/47/124/207/13	P.Y SURASENA	NO:33,THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	39	33/47/124/208/12	H.C.D FERNANDO.	NO:34, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	40	33/47/124/209/11	D.S.P THILAKARATNE	NO:35, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	41	33/47/124/210/18	M.W.A NANDANA	NO:36, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	42	33/47/124/211/17	M.A CHAMINDA	NO:37, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	43	33/47/124/212/16	M.W PIYADASA	NO:38,THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	44	33/47/124/213/15	D NILANTHA	NO:39, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	45	33/47/124/214/14	M. PRADEEP RAVEENDRA	NO 28 , THUDHWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	46	33/47/124/215/13	G. NISHAD KUMARA	NO 41 , THUDHWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	47	33/47/124/216/12	T.B SUMITH KUMARA	NO:42, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	48	33/47/124/217/11	M.K UPUL KUMARA	NO:43,THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	49	33/47/124/218/10	K.W NANDASIRI	NO:44, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	50	33/47/124/219/19	T.H. SIDNY ANANDA	NO 45 ,THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	51	33/47/124/220/16	A.G. PRADEEP UPUL	NO 46 ,THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	52	33/47/124/221/15	G.A. SAMARAPALA	NO 47, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	53	33/47/124/222/14	A KEERTHI HASAN	NO:48,, THUDUWAGODAWALA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	54	33/47/124/223/13	D. PUNCHINONA	NO 49, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	55	33/47/124/224/12	T.H. ARUNA KRISHANTHA	NO: 50, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA

Category Code & Customer Category	S/N	Account No	Name	Addresss
10 - Domestic	56	33/47/124/225/11	M. SHANKER	NO 51, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	57	33/47/124/226/10	K. LILINONA	NO 52, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	58	33/47/124/227/19	W. RANJITH	NO 53, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	59	33/47/124/228/18	G. RANASEELI	NO 54, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	60	33/47/124/229/17	D. PUSHPANGANI	NO 55, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	61	33/47/124/230/14	J.K. DAYAWATHIE	NO 56, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	62	33/47/124/231/13	M.H.R KOYTEX	NO:57, THUDUWAGODAWALA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	63	33/47/124/232/12	S.H. SANDYA NISHANIKA	NO 58,THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	64	33/47/124/233/11	P.Y. UDAYA PRASANNA	NO 59 , THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	65	33/47/124/234/10	K.K. SOMAWATHIE	NO 60, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	66	33/47/124/235/19	K.P. RANI PADMALATHA	NO 61 , THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	67	33/47/124/236/18	K.K. SUNIL	NO 62, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	68	33/47/124/237/17	M. CHANDRALATHA	NO 63, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	69	33/47/124/238/16	H.W. SENANI MANEL KUMARI	NO 64 , THUDUWEGODAWELA HOUSING SCHEME, AMARASENA MAWATHA, HIKKADUWA
	70	33/47/124/239/15	A.L. KULARATHNA	NO 65, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	71	33/47/124/240/12	U. WARSHAVITHANA	NO 66, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	72	33/47/124/241/11	A.P. SEETHA	NO 67, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	73	33/47/124/242/10	K. PREMAJAYANTHA	NO 68, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA

Category Code & Customer Category	S/N	Account No	Name	Addresss
10 - Domestic	74	33/47/124/243/19	L.L. WIJITHA KUMARA	NO 69, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	75	33/47/124/244/18	K.G NIRMALA NUSANTHE	NO:70, THUDUWAGODAWALA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	76	33/47/124/245/17	J.K. KUSUMAWATHI	NO 71, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	77	33/47/124/246/16	K.P. WIMALATUNGA	NO 72, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	78	33/47/124/247/15	K.G. SAMAN	NO 73, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	79	33/47/124/248/14	B.M.A. SUDATH PRASANNA	NO 74 ,THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	80	33/47/124/249/13	A.G. NUWAN KALUM	NO 75 , THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	81	33/47/124/250/19	M.K. NIMALASIRI	NO 76, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	82	33/47/124/251/18	S.W. MALLIKA	NO 77, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	83	33/47/124/252/17	M. NALIN RAVEENDRA	NO 78 ,THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	84	33/47/124/253/16	A.G. LALITHA	NO 79, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	85	33/47/124/254/15	P Y SURESH HARSHANA	NO 80, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	86	33/47/124/255/14	B DAMITH KUMARA	NO:81,THUDUWAGODAWALA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	87	33/47/124/256/13	H.J. KUMUDUNI PRIYANTHA	NO 82 ,THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	88	33/47/124/257/12	K. WAYALA RANJANI	NO 83 , THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	89	33/47/124/258/11	G. IRESHA LAKMALI	NO 84 ,THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	90	33/47/124/259/10	L.R. RANJITH	NO 85, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	91	33/47/124/260/17	P.W. SUMITH KUMARA	NO 86, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA

Category Code & Customer Category	S/N	Account No	Name	Addresss
10 - Domestic	92	33/47/124/261/16	K.K. GAMINI SARATH CHANDRA	NO 87 ,THUDUWEGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	93	33/47/124/262/15	M.A. GUNAWATHI	NO 88, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	94	33/47/124/263/14	B.H. KALYANI	NO 89, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	95	33/47/124/264/13	K DAMMIKA NEEL	NO:91,THUDUWAGODAWALA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	96	33/47/124/265/12	W.S.D. NILANTHA	NO 92, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	97	33/47/124/266/11	K.B. KARUNATHILAKA	NO 93, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	98	33/47/124/267/10	S.W.A.P.C. KUMARA	NO 94, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	99	33/47/124/268/19	P.B. CHANDRASIRI	NO 97, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	100	33/47/124/269/18	R.T.B. CHAMINDA	NO 99 , THUDUWAGODAWELA HOUSING SCHEME ,, AMARASENA MAWATA, HIKKADUWA
	101	33/47/124/270/15	K. SOMASIRI	NO 100, THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	102	33/47/124/271/14	G.M. JOSALIN NONA	NO 101 , THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	103	33/47/124/272/13	H.P.J. HEMAKUMARI	NO 102 , THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	104	33/47/124/273/12	L.W. SUNIL DE SILVA	NO 103 , THUDUWAGODAWELA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	105	33/47/124/274/11	G.G RATNA SILVA	NO:104, THUDUWAGODAWALA HOUSING SCHEME, AMARASENA MAWATA, HIKKADUWA
	106	33/47/124/275/10	W SHANTHA CHULANANDA	NO:105, THUDUWAGODAWALA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	107	33/47/124/276/19	T JAYAWEERA	NO:106, THUDUWEGODAWELA HOUSING SCHEME,, AMARASENA MAWATA, HIKKADUWA
	108	33/47/124/290/11	G.G. GNANARATHNA	NO 98 ,THUDUWEGODAWELLA H.S. ,, ., HIKKADUWA
	109	33/47/124/295/16	S.K. CHANDRAPALA	NO 90 , THUDUWEGODAWELA ,, AMARASENA MAWATA, HIKKADUWA
	110	33/47/124/310/17	. KELUM JANAKA JAYASINGHE	NO:-96, THUDUWE - GODA - WELA, TEMPLE ROAD, HIKKADUWA

	S/N	Account No	Name	Addresss
10 - Domestic	111	33/47/124/335/18	W.D. UDAYANGA	NO:331/A, TEMPLE ROAD,, THUDUWEGODA,, HIKKADUWA.
	112	33/47/133/022/17	S GUNASEKARA	NO 632, "SITHINI", GALLE ROAD, HIKKADUWA
	113	33/47/133/030/17	N V DEVID	DELPOLWATTA, NARIGAMA, HIKKADUWA
	114	33/47/133/031/16	M P JAYAWATHIE	GALLE ROAD, NARIGAMA, HIKKADUWA
	115	33/47/133/181/14	W.H. SEETHA	NO 622,, GALLE ROAD,, NARIGAMA,HIKKADUWA.
	116	33/47/133/182/13	G.K.H. MADUSANKA	NO 02, WAWALGODA,, NARIGAMA,HIKKADUWA.
70 - Commercial Institutes	117	33/47/110/009/12	H. V. SAMAN PRIYANKARA	356/A, GALLE ROAD, HIKKADUWA
	118	33/47/110/050/10	R.M.K PUSHPASIRI KUMARA	NO:-235/6, WELLABADA, HIKKADUWA
	119	33/47/110/172/13	T T NISHAN CHAMINDA	NO 348, GALLE RD., HIKKADUWA
	120	33/47/110/176/19	M SAMARASEKARA	352, GALLE ROAD, HIKKADUWA
	121	33/47/110/180/13	T.G. KARALAIN	NO:-356, GALLE ROAD, HIKKADUWA
	122	33/47/110/188/15	G L UPALI GUNAWARDANA	NO 289, GALLE ROAD, WAWLAGODA, HIKKADUWA
	123	33/47/110/190/11	G L D GUNAWARADANA	HETTIGE WATTA, WAWLAGODA, HIKKADUWA
	124	33/47/110/200/19	G K NIMAL CHICKERA	"SEA VIEW HOTEL", NO:- 295, GALLE ROAD, HIKKADUWA
	125	33/47/110/202/17	T G KARLAIN	NO 356, GALLE ROAD, WAWULAGODA, HIKKADUWA
	126	33/47/110/204/15	N V JAYAWEERA	DOLPHIN BOAT SERVICE, GALLE ROAD, HIKKADUWA
	127	33/47/110/208/11	G K R CHIKERA	NO 297, SEAVIEW PIZZA HOUSE, GALLE RD., HIKKADUWA
	128	33/47/110/246/15	B.K. PADMA RANJANIE	NO 319 A, SADAGIRI DRESS BOTIQUE, GALLE ROAD, PANNAMGODA, HIKKADUWA
	129	33/47/110/266/10	G NILANKA SAMEERA DE SILVA	NO:-322 A, GALLE ROAD, PANNAMGODA, HIKKADUWA
	130	33/47/110/268/18	D.P CHAMPIKA MANEL	NO:-333,GALLE ROAD, PANNAMGODA, HIKKADUWA
	131	33/47/110/270/14	. THE MANAGER	HIKKADUWA HOLIDAY RESORTS (PVT) LTD, ., HIKKADUWA
	132	33/47/110/292/18	G.K HEMAL DIAS GUNASINGHE	NO:317, GALLE ROAD, HIKKADUWA
	133	33/47/110/298/12	K. SAMANTHA KUMARA	358/D,, GALLE ROAD, HIKKADUWA
	134	33/47/110/366/19	W. NIROSHA	NO: 358E,, GALLE ROAD,, HIKKADUWA.
	135	33/47/115/008/12	G S S DE SILVA	370, GALLE ROAD, PANNAMGODA, HIKKADUWA

Category Code & Customer Category	S/N	Account No	Name	
70 - Commercial Institutes	136	33/47/115/038/16	L A JAYALATH	NO 382/1, GALLE RD., HIKKADUW
	137	33/47/115/048/14	N S L DE S URAGODA	NO 384 GALLE ROAD, HIKKADUW
	138	33/47/115/058/11	K H L DE SILVA	NO 359/B2, WEWALA, HIKKADUW
	139	33/47/115/060/17	K.W GAMINI	NO:-361, GALLE ROAD, WEWALA,
	140	33/47/115/064/13	M U DE SILVA	NO 363 GALLE ROAD, HIKKADUW
	141	33/47/115/066/11	B K SOMASIRI	NO 365, GALLE ROAD, WEWALA, H
	142	33/47/115/070/15	K B KORALA	NO 369 GALLE ROAD, HIKKADUW
	143	33/47/115/100/19	B K GNANAWATHIE	NO 412 GALLE ROAD, HIKKADUW
	144	33/47/115/104/15	R.S.W GUNAWARDANA	NO 399 GALLE ROAD, HIKKADUW
	145	33/47/115/225/19	A. THUSHITHA THILANKA JAYASINGHE	NO; 383, GALLE ROAD, WEWALA,
	146	33/47/115/267/18	P.M.S.P. KUMARA	NO.414/1 , GALLE ROAD ,, WEWA
	147	33/47/124/331/12	NILANTHI GALLAGE	NO:56/C,, AMARASENA MAWATHA
	148	33/47/124/502/15	. ANITHA WIJETHUNGA	NO:225/,, AMARASENAMAWATHA,
	149	33/47/128/005/18	G SARATHCHANDRA	NO 329/2,SUSILACHANDRA MAWA
	150	33/47/128/635/16	R.S.P.DE.S KULATHILAKA	NO: 325/D,, GALLE RD., HIKKADU
	151	33/47/132/023/18	M.H GUNARATHNE	NO 484, GALLE ROAD,, HIKKADUW
	152	33/47/132/040/17	I P CHNADRDASA	GALLE ROAD, WEWALA, HIKKADU
	153	33/47/132/045/12	S SOMASIRI	VILLA PARADISE REST, WEWALA,
	154	33/47/132/107/17	DIRECTOR D.M.W. INVESTMENT (PVT) LTD	NO 534, GALLE ROAD, WEWALA, H
	155	33/47/132/130/18	S D GUNAWARDANA	NO 536, MASKADEGEWATTHA,, G

Category Code & Customer Category	S/N	Account No	Name	Addresss
70 - Commercial Institutes	156	33/47/132/136/12	A AMARASINGHE	NO 538/1 , KASALANKA,, WEWALA, HIKKADUWA
	157	33/47/132/138/10	. NIHAL SENEVIRATHNA	NO:462/2,, WEWALA, HIKKADUWA
	158	33/47/132/140/16	. THE MANAGER	A B K RESTURANT, WEWALA, HIKKADUWA
	159	33/47/132/148/18	K D I S KARUNASENA	NO 548, GALLE ROAD, WEWALA, HIKKADUWA
	160	33/47/132/150/13	S WANNAKUKORALA	NO 548,, WEWALA, HIKKADUWA
	161	33/47/132/170/19	S WANNAKOKORALA	NO:-554/4, HOTEL MONBEEM, WEWALA, HIKKADUWA
	162	33/47/132/175/14	APDH DIAS	NO "SUDHARSHANA", NARIGAMA, HIKKADUWA
	163	33/47/132/440/13	DHARSHANA NISHANTH SENEVIRATHNA	492, GALLE ROAD, WEWALA, HIKKADUWA
	164	33/47/132/468/10	. CHINTHA MALKANTHI MUNASINGHE	NO:-536/2, GALLE ROAD, WEWALA, HIKKADUWA
	165	33/47/132/469/19	. ANURA SHANTHA PANDITHA	NO:-520, GALLE ROAD, WEWALA, HIKKADUWA
	166	33/47/132/471/15	R. LAKMINDA WICKRAMASINGHE	WEWALGODA ROAD,, WEWALA, HIKKADUWA
	167	33/47/133/002/11	K.H UDAYA ROHANA	NO:533, GALLE ROAD., NARIGAMA, HIKKADUWA
	168	33/47/133/006/17	J K PANDITHA	THELPOL WATTA, NARIGAMA, HIKKADUWA
	169	33/47/133/007/16	K A SUNIL DE SILVA	NO 584, GALLE ROAD, HIKKADUWA
	170	33/47/133/013/18	I LALITH PRIYANKARA	NO:- 602, NARIGAMA, HIKKADUWA
	171	33/47/133/019/12	D G R DIAS	NO 08 NARIGAMA, HIKKADUWA, HIKKADUWA
	172	33/47/133/020/19	W H SEETHA	NO 622 , "TOP SECRET" , GALLE ROAD, NARIGAMA, HIKKADUWA
	173	33/47/133/033/14	B A NAWARATHNA	NARIGAMA, HIKKADUWA, HIKKADUWA
	174	33/47/133/066/14	K THUSHARA PRADEEP	NO 101/2A , WEWALA ROAD, NARIGAMA, HIKKADUWA
	175	33/47/133/077/11	. MANAGER	NO:-572,SUN BEACH HOTEL, NARIGAMA, HIKKADUWA
	176	33/47/133/084/12	N.V. NEELAMANIE	NO.634/1,"NEELAS GUEST HOUSE",GALLE ROAD, NARIGAMA, HIKKADUWA
	177	33/47/133/089/17	. JAYANTHA GUNASEKARA	SEETHANI GUEST HOUSE, GALLE ROAD, NARIGAMA, HIKKADUWA
	178	33/47/133/183/12	N.V.S.H. KUMARA	NO 622/1,, GALLE ROAD,, NARIGAMA,HIKKADUWA.
	179	33/47/133/184/11	N.V.S.H. KUMARA	NO 622/2 ,, GALLE ROAD,, NARIGAMA,HIKKADUWA.

Category Code & Customer Category	S/N	Account No	Name	Addresss
71 - Tourist / Guest	180	33/47/110/054/16	. THE MANAGER	HIKKADUWA BEACH HOTEL, HIKKADUWA, HIKKADUWA
	181	33/47/110/146/16	. DHUSHYANTHY JAYAWARDENA	NO 322, GALLE ROAD, HIKKADUWA
	182	33/47/110/154/15	. THE MANAGER	CORRAL SAND HOTEL, GALLE ROAD, HIKKADUWA
	183	33/47/110/162/15	H W NELSON DIAS	NO 38,, GALLE ROAD, HIKKADUWA
	184	33/47/110/164/13	DIRECTOR BANSEL ROYAL RESORTS HIKKADUWA PLC	GALLE ROAD,, HIKKADUWA.,
	185	33/47/110/360/15	. THE MANAGER	NO 261, CORAL SAND HOTEL, GALLE ROAD, HIKKADUWA
	186	33/47/110/361/14	. THE MANAGER	NO 326, HOTEL BLUE CORRALS, GALLE ROAD, HIKKADUWA
	187	33/47/110/362/13	. THE MANAGER	HIKKADUWA HOLIDAY RESORTS (PVT) LTD, ., HIKKADUWA
	188	33/47/115/026/10	N M DE SILVA	WEAWALA BEACH HOTEL, GALLE ROAD, HIKKADUWA
	189	33/47/115/062/15	. GENERAL MANAGER	HOTEL LANK SUPER CORRAL, HIKKADUWA, HIKKADUWA
	190	33/47/115/080/13	G L S GUNAWARDENA	HOTEL FRANISIS, NO 389 GALLE ROAD, HIKKADUWA
	191	33/47/115/120/15	C H KEEPASTINE	BLUE NOTE HOTEL, HIKKADUWA, HIKKADUWA
	192	33/47/115/307/10	THE MANAGER	HIKKADUWA BEACH RESORT PLC, HIKKADUWA,
	193	33/47/132/195/10	U WEERASEKARA	HANSA SURF HOTEL, NARIGAMA, HIKKADUWA

Hikkaduwa Water Reclamation Staff

Initiation of Sanitation Safety Plan

Tree Planting Programme