A photograph of a worker in blue overalls and a blue hard hat operating a large white vacuum truck. The worker is holding a long, yellow, corrugated hose that extends across the ground. The truck has a large cylindrical tank and various mechanical components. The text "VTU - 11" is visible on the side of the truck. The scene is outdoors, likely at a construction or maintenance site.

Septage Management Guide for Local Governments

A step-by-step practical guide to developing effective septage management programs for cities and municipalities

By

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Does Your Local Health Authority Need This Septage Manual?

Are there currently septic tanks in place and in use in your jurisdiction?
Yes/No

Are there local providers of septic services in your area?
Yes/No

Are these providers licensed and/or regulated?
Yes/No

Are septage management services in your area standardized?
Yes/No

Is your local health authority responsible for septage management?
Yes/No

Does your local health authority have in place, or does your local health authority plan to implement septage management programs?
Yes/No

If you answered “Yes” to any of these questions, please consider reading and following this guide to help develop effective septage management programs for your community.

This manual contains information pertaining to the following key components of a comprehensive septage management program:

1. *Septic Tank Design and Construction.* Regulatory oversight and considerations for the design, installation and use of septic tanks including a model ordinance template.
2. *Procedures for Septic Tank Pumping and Septage Transportation.* Best practices for transporting the septage once it is removed from the tank.
3. *Recordkeeping and Reporting.* Mechanisms such as manifests, receipts, and other records.
4. *Septage Treatment and Disposal.* Rules that prescribe the septage treatment and disposal requirements.
5. *Full Cost Recovery.* Mechanisms that provide for full cost recovery of infrastructure, staff, and operational expenses for the program.
6. *Social Marketing.* Selling the concept of improving sanitation to the people.

Additionally, this document includes a series of sample forms and a model septage ordinance that can be used by local governments as templates for crafting and customizing their own septage management programs.

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Introduction

The direct relationship between diseases such as cholera, hepatitis and dysentery and the unrestricted discharges of residential sewage is well documented. The septic tank is a simple device and when designed, installed, and operated properly, can serve as the first step in the sewage treatment process, which transforms human waste into a manageable effluent. Effluent can be further treated, reused or disposed of, thus breaking a cycle of disease that is responsible for huge economic losses, countless lost lives, and immeasurable human suffering. In order to be effective, enforcement at the local level can ensure the adherence of best practices to regulate septic tanks and on-site wastewater management.

Septage is the contents of septic tanks. It includes the liquids, solids (sludge), as well as the fats, oils and grease (scum) that accumulate in septic tanks over time. Comprehensive programs that regulate periodic septic tank cleaning, as well as septage transport, treatment, reuse, and disposal are becoming important for cities throughout South and South East Asia. These programs serve to improve sanitation while reducing the prevalence of waterborne diseases. In order to be effective, such programs must consider existing septic tank practices in regards to usage, design, and construction, as well as the transportation and treatment capacity of the local governments or concessionaires tasked with implementing these programs.

One approach to septage management is for local health authorities to promulgate rules, ordinances or laws that dictate septic tank practices. These may include monitoring requirements or specifying pumping and de-sludging frequencies, as well as implementing best practices through all stages of septage handling. Such programs, when coupled with full cost recovery mechanisms based on user fees, can be especially effective.

The Role of Septic Tanks in South and South East Asia

South and South East Asia are currently struggling to meet the challenges of the Millennium Development Goals. Septic tanks will continue to play an important role as a basic tool in providing sanitation for millions of people as the regions implement World Bank and Asian Development Bank funded mega-wastewater systems. In rural, peri-urban, and even many urban settings, septic tanks are used as primary treatment devices that deliver settled effluent to open drains, combined sewers or even direct discharges to surface waters. Even as population centers become sewered, the septic tank often remains an integral component of the sewerage scheme. For example, the Third Manila Sewerage Project, a \$64 million dollar program to develop sewers and treatment plants for much of metro Manila, is based on the concept of intercepting effluent laden drainages in combined sewers, and pumping this wastewater to treatment systems designed for treating dry weather flows. Under this scheme, existing septic tanks will remain the initial stage of the sewage treatment process. Meanwhile, Manila Water Company (the water and sewer concessionaire) is developing a network of septage treatment facilities and purchasing fleets of septage vacuum trucks to accommodate this huge demand.

Since the septic tank remains a key link in the sewerage chain, local and national governments must build their capacities to manage effective oversight programs for septic tank practices. Such comprehensive management programs should empower local governments to take the necessary actions to ensure compliance with critical septage program components.

Current Situation

Septic tank practices in South and South East Asia are traditionally haphazard and this continues to be the case. Septic tanks are often dramatically undersized and poorly constructed. Septic tanks are frequently installed underneath homes, driveways, or sidewalks due to small lot sizes, thus making access for inspecting or desludging difficult. In many instances, what people refer to as “septic tanks” are not septic tanks at all, but are instead seepage pits or cesspools. These unlined, earthen receptacles not only do a very poor job at treating sewage, but they frequently serve as direct conduits to aquifers, resulting in fecal contamination that can impact precious drinking water supplies.

Common, but incorrect septic tank practices in SE Asia encourages the use of the “bottomless” design, where effluent is discharged by seeping out of slots or holes in the tank floor. Such tanks are often constructed with two compartments. The first compartment is the “treatment” chamber, and the second compartment is the “leaching chamber”. While the idea that treated septic tank effluent may be

applied to the soils for disposal is recognized under certain conditions, such leaching septic tanks rarely have enough soil interface to accomplish proper leaching. Instead, they discharge effluent through the dirtiest part of the tank, the sludge layer, which can lead to serious groundwater pollution problems.



Social Marketing Campaign poster – Dumaguete City, Philippines, 2006

Environmental Protection Agency’s (US EPA) design criteria for a modern septic tank. However, at least in the Philippines’ case, there remains a discrepancy between applying and implementing national laws at the local level.

While a comprehensive septage management program that empowers inspectors and officials at the local level would certainly help, it cannot exist in a vacuum. Institutional support through comprehensive training programs for inspectors and program managers, as well as social marketing efforts to sell the concept of septage management to the people, will be integral components of the program.

Elements of a Comprehensive Septage Management Program

There are six key elements to a comprehensive Septage Management Program. They are:

1. *Septic Tank Design and Construction.* Regulatory oversight for the design, installation and use of septic tanks.
2. *Procedures for Septic Tank Pumping and Septage Transportation.* Best practices for pumping and transporting the septage once it is removed from the tank.
3. *Recordkeeping and Reporting.* Mechanisms such as manifests, receipts, and other records.
4. *Septage Treatment and Disposal.* Infrastructure to accomplish septage treatment, disposal and reuse.
5. *Full Cost Recovery.* Mechanisms that provide for full cost recovery of infrastructure, staff, and operational expenses for the program.
6. *Social Marketing.* Selling the concept of improving sanitation to the people.

In order to be effective, comprehensive septage management programs should have the support of the key stakeholders including the communities being served, the service providers, implementing agencies at the local government level, mayor, city councilors and other elected officials. Even when this level of support is present and fueled by effective social marketing campaigns, an overarching regulatory framework, such as a local ordinance or law will help ensure compliance.

I.0 The Septic Tank – Design and Construction

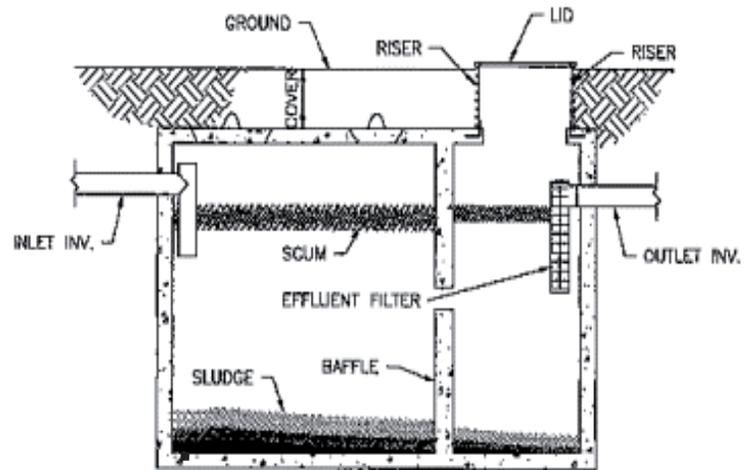
A septic tank is a receptacle for sewage. As sewage is detained in the tank, it undergoes a series of transformations driven by the physical actions of separation and the microbial processes that reduce and degrade organic components and nutrients found in wastewater streams. The United States Environmental Protection Agency (US EPA) defines a septic tank as:

A watertight, on-site treatment system for domestic sewage, consisting of two or more compartments, in which the sanitary flow is detained to permit concurrent sedimentation and sludge digestion.

I.1 Septic Tanks – Design Criteria

Proper septic tank design considers several factors:

- The septic tank is **sized** properly with appropriate detention time and volume
- There are proper **inlet and outlet** structures
- There is at least one **baffle** separating the tank into multiple compartments
- They are **water tight**
- There is an **access port** for each compartment that allows for inspection and pumping



Typical septic tank with two compartments, access port inlet and outlets, and baffle creating two compartments

Many factors influence the efficiency of the septic tank as a wastewater treatment device. These include:

Detention time. A minimum of two days of detention time is required to accomplish appropriate physical separation of the heavier solids and the lighter fats, oils, and greases that are common constituents of residential sewage. This volume, calculated at two times the average daily flow, also provides adequate storage for the solids that accumulate in the tank. These solids are reduced over time by the process of anaerobic digestion. While periodic desludging is required to address the over-accumulation of solids, ensuring proper septic tank size minimizes pumping requirements to an average of once per 3 to 5 years.

This simple table illustrates the relationship of the size of the septic tank relative to flow. It specifies the frequency of periodic pumping required to remove accumulated solids. A larger tank volume relative to the flow increases the time in-between septic tank desludging. Interestingly, it is not a simple linear relationship, but a logarithmic one. This serves to illustrate two important points about septic tanks and sizing:

- First, increasing the size of the tank relative to flow improves performance. The greater the detention time, the better the solids separation and anaerobic treatment, resulting in a higher quality effluent.

Tank Size (liters)	(number of people in the household)					
	1 person	2 people	3 people	4 people	5 people	6 people
2000	5.8	2.6	1.3	1.0	0.7	0.3
3000	9.1	4.2	2.6	1.8	1.3	1.0
3600	11.0	5.2	3.3	2.3	1.7	1.3
4000	12.4	5.9	3.7	2.6	2.0	1.3

- Second, increasing the size of the tank relative to the flow can have a dramatic impact on maintenance costs of the septage program, since less septic tank cleaning is required.

These are two excellent reasons why local governments may choose to enforce septic tank sizing regulations as one component of a comprehensive septage management program. *Reducing the frequency of required pumping saves the local government money.*

Water tightness. Water-tight tanks help protect the environment from discharge of poorly-treated sewage. Water-tightness also prevents ground or surface water from entering the tank through infiltration. Care during septic tank construction to ensure water tightness is a best management practice for effective septage management programs. New septic tanks should be leak tested and certified “water tight” prior to being placed into service. Certification protects both the environment and the homeowners’ investment in the tank.

Compartments. Septic tanks use baffles to separate the tank and increase retention of solids. Most national codes require a minimum of two compartments. It is common for the first compartment, which is responsible for most of the sludge storage, to be designed to accommodate 2/3rds of the tank volume. While some local governments insist on requiring a minimum of three compartments, there is no statistical evidence that the extra compartment improves overall performance.



Septic tank profile showing inlet and outlet structures

Inlet and outlet structures. Septic tanks are designed with inlet structures that deliver sewage to the tank under quiescent conditions by introducing the flow below the level of the water. Similarly, effluent structures remove effluent from the “clear zone”, which is mid way between the level of the accumulated sludge and the scum layer that floats on the water surface. An effluent filter maybe added to insure that solids remain in the tank. Filters may increase the treatment capability of a septic tank by as much as 25%.

Access ports for inspection and desludging. Septic tanks are often installed under houses in places where lots are small or home construction is unregulated. This often results in septic tank access ports being buried under concrete slabs or kitchen floors. Since excavating a kitchen floor to install access ports is an impediment to routine inspection and cleaning, this practice should be avoided. Furthermore, proper setbacks will protect building foundations from settling.

Strict adherence to proper setbacks from drinking water wells, water standpipes, or surface water intakes is important for maintaining public health. Septic tanks may become damaged or leak even under ideal conditions. Protection of drinking water resources is of paramount importance when considering septic tank placement. Standard setbacks must be strictly enforced.

SETBACK TABLE	
FEATURE OF POTENTIAL IMPACT	SEPTIC TANK
BUILDING	10
PROPERTY LINE SHARED	50
ALL OTHER PROPERTY LINES	5
WATER SUPPLY WELL	100
PERENNIAL OR INTERMITTENT STREAM	100
LAKE OR RESEVOIR	100
ANY DRINKING WATER INTAKE	200
DRAINAGE EASEMENT (+5 ACRES)	50
WATER MAIN OR BRANCH	10
DOMESTIC WATER SERVICE LINE	5
DOWNSLOPE CUTBANKS, BAR DITCH	5
DRIVEWAY	5
SWIMMING POOLS	15
EASEMENT	5

Table of recommend setbacks in feet

I.2 Approved Materials

Concrete is a common material for septic tank construction. Concrete may be poured in place or as grout-filled hollow blocks. Plastic and fiberglass are also approved materials. Steel, wood, or other materials that are subject to decomposition in soil should never be used.

I.3 Approved Service Providers

Civil or sanitary engineers are typically responsible for designing septic tanks and sewage systems. Licensed plumbers may also provide this service in some areas. Other jurisdictions establish licensing programs that include testing and certification. There should be oversight by a regulatory body or licensing board through which citizens are able to register complaints for poor work, errors or omissions. The regulatory body should have the power to take disciplinary action against substandard service providers, including the power to levy fines and suspend licenses.

Practical Notes: Existing septic tanks are difficult to modify as they are often constructed under structures or otherwise inaccessible.

Recommendation: Existing septic tanks should be upgraded to meet current codes:

- When properties are substantially remodeled (new bedrooms or bathrooms)
- As a condition of sale (if space is available)

Recommendation: Local governments should require new developments to:

- Install properly designed septic tanks
- Meet all local and national codes, and setback requirements
- Use cluster septic tanks for multiple housing if setbacks for individual tanks can not be maintained

Recommendation: Local governments should require new subdivisions to have full wastewater treatment (septic tanks and effluent treatment systems)

2.0 Regulatory Compliance Programs: Permitting and Inspecting

2.1 The Role of the Local Health and Building Departments

Local governments can best ensure septic program compliance by requiring permits for:

- all new septic tank construction
- projects proposing changes of commercial property
- projects proposing substantial remodels or repairs

Applications for septic permits should be reviewed and issued by the Local Health Authority. The review stage should include a review of the plans and application forms for compliance with local programs and national law, and a site visit to verify that the drawings submitted match the field conditions. The permit should be issued only after plans have been deemed acceptable and the Health Inspector has verified the septic tank can actually be installed according to the drawings and site conditions.

2.2 Septic Permits

A septic permit application should include:

- Information about the owner and the facility, including site address, mailing address, and contact phone number
- Site plans drawn to scale showing the property lines, slopes, buildings, side walks and driveways, cut banks, water lines and other utilities, and any other feature of the property that might impact on the installation of the septic tank and any disposal facilities
- Drawing of the septic tank, including construction materials, baffles, inlet and outlet structure, cleanouts and access ports
- Drawings of any other treatment or disposal facilities including leach trenches or effluent sewer connections
- Schedule of proposed construction
- Contractor name and certification

See Appendix 4 – Sample Septic Permit Application Form

2.3 Inspecting Septic Tanks

There are generally three officials who can conduct a septic tank inspection:

- 1) Inspections by Health Inspector – Health Inspectors typically issue permits and perform construction inspections. Health inspectors receive specialized training to deal with wastewater treatment and disposal issues. This is particularly important where septic permits include infrastructure for advanced treatment or effluent disposal, such as soils based leaching systems. These facilities may be more sophisticated than a simple septic tank where the specialized training of the Health Inspector may be better utilized.
- 2) Inspections by Building Official or Engineering Department – It is often the building official's responsibility to perform field inspections. Since the building inspector is monitoring construction of the building anyway, with a little more training on septic tank construction, that official can verify that construction of the system is in accordance with the septic permit that has

been issued. Having the building official responsible for septic tank construction inspections saves additional trips to the site and may provide further economic benefit to the LGU.

- 3) Inspections by the Private Sector – Private sector inspections or inspections from “approved” service providers are programs that Local Governments may wish to use. In order to be effective, such programs incorporate “service provider approval” mechanisms such as certifications, licenses or other authorizations from the Local Government that registers a person or firm to perform construction inspections or certifications. There is also a licensure or review board that the LGU can organize to review complaint cases or sanction service providers for poor performance. Such programs minimize the expense that Local Governments have to pay for providing the service and helps build local capacity.

3.0 Pumping and Desludging Septic Tanks

The sludge level in septic tanks is determined by the use of a probe on a long handle that the operator submerges into the tank and feels for the sludge level. This is a very accurate way to gauge sludge depths. Comprehensive programs that provide annual inspections and pumping as needed may be more advantageous than prescribing mandatory pumping on a set schedule. This is true especially for programs with limited septage treatment or hauling capacity.

There are many benefits associated with routine and periodic septic tank desludging, including:

Increased Efficiency

Septic tanks work best when detention time in the tank is maximized. As accumulated sludge reduces available tank volume, the resulting decrease in detention time impacts the tank's function and ability to separate heavier solids from lighter fats and oils.

Higher Discharge Quality

Septage has a much higher concentration of pollution constituents than septic tank effluent. Biochemical Oxygen Demand (BOD) and total suspended solids (TSS) are two common measurements of the strength of wastewater. Septage may have BOD concentrations between 2,000 and 20,000 mg/l and TSS values in excess of 50,000 mg/l, where septic tank effluent has values averaging 200 mg/l BOD and 300 mg/l TSS. As septic tanks fill with sludge, the effluent begins to resemble septage with dramatically higher pollution values. *Therefore, regular desludging provides dramatic improvements in effluent quality.*

How Often To Pump

Ideally, septic tanks should be pumped only when necessary. On average, the US EPA states that septic tanks should be pumped every five to seven years. Other organizations recommend three to five years, and still others recommend every seven to thirteen years. Unnecessary pumping places an undue burden on pumping, transpiration, treatment and disposal facilities. Since families generate varying volumes of sludge at different rates, pumping programs that focus on routine inspection and pumping when required, rather than mandated periodic pumping, are most efficient.

Prior to sending the septage truck to a neighborhood for desludging activities, service providers may consider sending an advance crew to the area to inform homeowners of the pumping activities, to locate septic tank manholes and access ports, and probe tanks to determine the level of accumulated sludge. This activity will identify which tanks require pumping, and which may wait until the next cycle. Often, the cost of using workers for these tasks is more cost effective than adding pumping, transport and treatment capacity.

Practical Notes: Ideally, septic tanks should be pumped when needed based on the volume of accumulated sludge. Community run education programs, such as distributing flyers about the proper care and maintenance of septic tanks help inform people what they should and should not put in the tank. Simple educational programs can dramatically reduce the cost of septage programs.

3.1 Procedures for Pumping Septic Tanks - Manual of Practice

Specific procedures for pumping, and the transportation activities of the septage management program are specified in a Manual of Practice. The Septage Program Managers should prepare a Manual of Practice by first reviewing the operations procedures for specific equipment and then documenting all aspects of the day-to-day procedures. These procedures include:

- Scheduling and routing for trucks
- Customer service protocols
- Locating tanks and cleanouts
- Probing tanks to determine sludge levels
- Proper pumping equipment operation and worker safety
- Site control, including post-pumping clean-up
- Transportation requirements, including rules of the road
- Disposal procedures at the treatment facility
- Routine service of equipment – greasing and oiling, minor repairs
- Recordkeeping for all tanks pumped and wastes discharged at the disposal facility

As each program is different and utilizes different equipment, the Manual of Practice is program-specific. A Manual of Practice is an important document since it provides guidance for the equipment operators. Furthermore, it is a valuable training document for new employees. The Manual can specify set procedures that employees should follow so that their work is done within specified guidelines.

To create a Manual of Practice, senior management should accompany the septage hauler on their regular routes and observe and photograph their procedures. The procedures should be recorded in a step-by-step field manual that becomes an addendum to the septage management regulations.

Practical Notes: A Manual of Practice is a useful tool for septage service providers. It can be used to:

- Train new employees on standard practices
- Share best practices with other local governments or service providers
- As Terms of Reference for subcontractors and their employees

3.2 Safety Concerns

Operating septage pumping equipment is dangerous. Operators are responsible for their personal safety as well as safety on the road.

Septage is infectious material. It can cause disease if ingested or if it comes in contact with broken skin. Hands must always be washed immediately after contacting septage or tools and equipment that may have contacted septage, and always before eating or drinking.

Septage workers should be immunized for tetanus, hepatitis A, and hepatitis B.



Employees must wear proper safety equipment

Smoking must be prohibited while operating septage equipment. Septic tanks may generate methane, an explosive gas. Smoking also promotes the hand-to-mouth route of infection.

Caution must be used around septic tanks and septic tanks must never be entered. People are killed every year in septic tanks, because tanks are confined spaces that may contain toxic or oxygen-limited atmospheres. Septic tanks also may collapse or break if excessive weight is placed on the lid or manhole cover.

Practical Note: Always secure septic tank lids with safety screws or locks. Keep children safe by keeping septic tank lids secure. Operators should never enter septic tanks for sludge removal or cleaning activities. All service activities must be performed from the ground surface.

4.0 Operating Procedures

4.1 Daily Preparation

- 1) Receive work orders for the day
- 2) Check vacuum truck and equipment
 - Check engine oil
 - Check air pressure in tires
 - Check safety back up horn
 - Check pumping truck equipment



Fittings: Hoses, clamps and fittings used to connect the main hose to the tanker and hoses to each other are critical for proper suction and pressure operations. Pictured here is a typical friction fitting. It should be used for suction activities only.

Use of this fitting for pressure back pumping is inappropriate as it can lead to hose separation, which can cause injury and splashing.

Always check fittings and connections prior to operations

- 3) Check Hoses – Frequently inspect hoses for cracks and wear – discard or repair worn and broken hoses

- 4) Check Fittings – Use of proper fittings is required for proper operation



Correct – Easy and quick - clamp style fittings ensure a tight, leak-proof connection



Incorrect – twine and plastic do not make for proper hose connections. This will cause leaks which may require cleanup

5) Check Personal Protective Equipment – All employees are responsible for maintaining their personal protective equipment in good condition:

- Gloves
- Boots
- Hard Hat and face mask

6) Check Disinfecting and spill control equipment – Operators should be trained on identifying spills and proper methods of disinfecting pavement and equipment in the event of a spill.

- Bleach solution – Typically one cup of bleach to 4 liters of water is a good solution for disinfecting surfaces.
- Lime – only use outside. Sprinkle over spilled area, wait 15 minutes, then wash with water
- Safety cones – set up safety cones around spilled areas until properly disinfected

In Asia, septic tanks are often located under the home. Should spills occur while desludging septic tanks in homes, special care to clean and disinfect surfaces is important to maintaining good customer relations and avoiding complaints.

7) Check Tools – make sure the truck is equipped with:

- Shovel, digging bar
- Rake
- Broom
- Lifting bar for tank lids
- Screwdrivers, vice grips, pliers for opening tank lids.
- Hand wash supplies (soap, towels, water, waterless hand washing soap)
- Log book, work orders, extra forms, receipts, pens
- Work orders for the day – review for special instructions
- Maps

8) Set schedule for the day – choose best route considering

- Traffic
- Most direct route
- Expected volumes of septage to pump
- Proximity to disposal site

4.2 Operating the Vacuum Truck Equipment

Operators should become familiar with the proper operation of the equipment in use for each operation. This includes the physical operation of the truck, and all valves, piping, power take-offs and ancillary equipment for the vacuum equipment (including the tank, valves, hoses, and fittings).

1. Proceed to first job.
2. Proceed with Staging Operations. Staging operations typically take place in the yard of the residence where the septic tank will be cleaned. The yard is where tools, equipment, and parts will be stored while the work is ongoing.
3. Greet the building owner. Public contact is an important part of the job. Good rapport with customers means fewer complaints and goodwill between the service provider and the public.



Checking the septic tank.

Before pumping, check the tank to look for obvious damage to the structure and to verify proper piping is in place. The water level will also give clues as to tank condition: high levels (above outlet level) indicates a clogged outlet; low levels (below outlet level) indicate a leaking tank.

Check for drain back into tank during pumping and when pumping is complete. Drain back may indicate a problem with plumbing in the house or clogged disposal.

Tank inlet tee in place as required. No cap on tee allows proper transfer of gases from the tank through the building plumbing stack

4. Have the building owner take the crew to the septic tank. The building owner is responsible for locating the tank lid and cleanout. The top of the tank lid should be less than 20 cm below natural grade. If it takes more than 15 minutes to locate or uncover the tank lid, the building owner should be billed for the time.
5. Open the access covers.
6. Inspect the interior and exterior of the tank. Check for:
 - Level of water or sludge up to the flow line of the outlet pipe – a water level below the flow line of the outlet indicates the tank leaks.
 - Check to see if inlet pipe and sanitary tee are in place.
 - Check tank construction to the extent possible. Look for cracks in the concrete and tank settling. Use of a mirror on a long pole can help to inspect the interior of the tank.
 - Number of compartments: if more than one, locate and remove lids from all compartments. Each compartment will require pumping.
 - Indications of high groundwater, saturated soils.
 - Use caution when pumping tanks during high groundwater conditions as unsecured tanks may float. Ask for local knowledge of the area to obtain this information.
7. Position the truck and prepare the truck for pumping.
 - Place safety cones around truck.
 - Chock the wheels.
 - Set parking break.
8. Remove the hoses and fittings required to complete pumping from the toolbox.
9. Probe the tank with the last length of hose. This will provide an indication on the volume of sludge to pump. To probe the tank, slowly lower the hose into the tank. As it passes down the water column, the resistance increases when the sludge layer is encountered. The sludge layer exists from the depth at which resistance is first encountered to the bottom of the tank.



Probe the tank.

Use the last length of hose to probe the tank. This will give an indication of the volume of sludge that will need to be removed.

To probe the tank, gently and slowly insert the hose into the tank. You will feel resistance when the hose reaches the top of the sludge level. Push the hose all the way down to the tank bottom. Now you have identified the level of the top and bottom of the sludge blanket.

10. Connect the hose to the truck tank. Screw or clamp fittings should be used in case back-pressure is required to break up sludge masses. Friction fittings may come apart during the pump back operation, thus exposing workers to a safety hazard.
11. Engage the pump or vacuum equipment. The operator will:
 - Make sure there is suction and that the pump is operating. Volume in the tank should start decreasing rapidly.
 - Use the hose to break up sludge and scum masses to the greatest extent possible.
 - As pumping commences, the operator will monitor the level gauge on the septage tank. Always ensure there is adequate volume in the septage tank to accommodate the load. If only a partial load can be pumped, monitor levels closely.
 - Monitor the septic tank as pumping progresses. Look for water flowing back from the outlet pipe or inlet pipe back to the tank as the water level decreases. Such flows may indicate problems with the disposal field or clogs in outlet lines. If these are observed, note them on the manifest form in the “comments” section.



Sight gauge. Pictured is a calibrated sight gauge that can be used to estimate volume of septage pumped. This gauge is calibrated in 250 liter increments. Use the sight gauge not only to determine when pumper truck is full, but to determine volume pumped for recording on the manifest form.

Low level and upper level (round) sight glasses are also provided. When possible, avoid running long distances with partial loads as this may create unsafe conditions while braking and turning.

12. After pumping is complete, check the tank for remaining sludge. If there are accumulated solids remaining, initiate the pump-back procedure, which is to send the pumped septage under pressure back into the tank and direct this flow toward the sludge mass. This will break up the mass, making

it possible to pump out. It is not necessary to pump the complete volume back into the tank. As little as 200-300 liters will be enough to break up the mass.

13. When pump-back is complete, pump out the tank again (suction). Repeat the above steps as needed. It is OK to leave as much as 100 to 200 liters of septage in the tank after cleaning.
14. Never pump out the entire contents of a tank during periods of high groundwater. If the groundwater is higher than the bottom of the tank, the tank may float out of the ground. In such conditions, leave enough contents in the tank to serve as ballast.
15. When pumping is complete, wash the hoses with water while directing the water stream back into the tank.
16. Replace the clean hoses back in the truck toolbox.
17. Replace the tank lids and secure.
18. Clean up any spills and disinfect with lime or bleach solution.



Improper fittings and hose connections cause leaks that must be disinfected with bleach or lime after pumping. Always leave the site clean after pumping.

4.3 Spill Control and Cleanup

IMPORTANT: All spills must be properly cleaned and disinfected with bleach or lime. Spills exceeding 100 liters of septage must be reported to the local health officer.

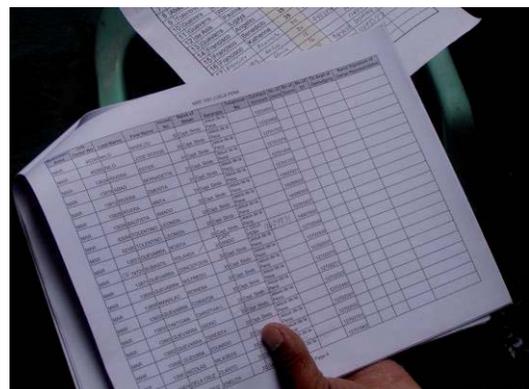
4.4 Recordkeeping and Manifests

Keeping accurate records regarding tanks and volume pumped is important for billing and compliance. Recordkeeping and manifest forms are an integral part of a comprehensive septage management program. Recordkeeping requirements should be codified into the law governing the program.

Manifest forms are simple receipts that specify:

- the location or address of the pumped septic tank
- septage characteristics (residential or commercial)
- the name and address of the property owner or occupier
- the volume of septage pumped
- any notes regarding tank deficiencies, missing pipes or fittings, improper manholes or access ports, any other cracks or damage observed

Once completed, a copy of the manifest is given to the owner as a receipt. When the load is delivered to the disposal site, the disposal site operator:



Keep accurate records of all pumping activities

- accepts the load
- verifies the volume
- takes a sample if needed
- signs the manifest proving receipt of the volume of septage disposed of

It may be advantageous for the operator to pump out multiple tanks before going to the disposal site. In this case, a multiple-load manifest form should be completed as well as individual manifest/receipt forms.

The completed document or documents should be given to the local government for their records. The manifest system is a tracking and compliance tool. It helps ensure that all of the septage pumped arrives at the disposal site and minimizes the opportunity for illegal discharge. It is also a record that some septage programs may choose to use for paying septage hauling subcontractors. For example, Manila Water Company, pays its hauling contractors based on the cubic meters of septage delivered to the disposal site as recorded on the manifest. This system accomplishes two main goals. First, it provides an incentive for haulers to make proper disposal at the treatment facility. Second, it provides an incentive for the pumper to pump as much volume out of the septic tank as possible. This is important since simply removing the liquid fraction of the septic tank doesn't remove the sludge, which is the fundamental goal of the pumping service.

Practical notes: Pumping back to loosen and break up sludge helps increase volume of sludge pumped. Many contractors are paid based on volume pumped, which provides an added incentive for removing as much sludge as possible.

Sample Wastewater Manifest Form (Local governments should modify to fit their needs):

HAULED WASTEWATER DISCHARGE MANIFEST

1. WASTEWATER STREAM IDENTIFICATION (MUST BE COMPLETED BY HAULER)

- a) Volume (liters) _____
- b) Type: ___ Holding Tank ___ Septic Tank ___ Other
- c) Source: ___ Resident ___ Restaurant ___ Office/commercial
 ___ Portable toilet ___ Industrial ___ Other
-

2. GENERATOR OF WASTEWATER

- a. Complete name: _____
- b. Phone number: _____
- c. Complete pick up address:

NOTE: ALL WASTEWATERS ARE SUBJECT TO THE RULES AND REGULATIONS AND TERMS AND CONDITIONS OF THE NUWARA ELIYA MUNICIPAL COUNCIL.

The undersigned being duly authorized does hereby certify to the accuracy of the source and type of hauled wastewater identified above and subject to this manifest.

Date: _____ Signature: _____

3. HAULER OF WASTEWATER

- a. Company Name: _____
- b. HWD Permit #: _____ c. Vehicle Lic. #: _____
- d. Pumpout date: _____

4. ACCEPTANCE BY NUWARA ELIYA MUNICIPAL COUNCIL AUTHORITY

The above hauler delivered the described wastewater to this disposal facility and it was accepted.

Disposal date: _____ Sample ID# (if required): _____

Signature of authorized agent and title: _____

The above described wastewater was picked up and hauled by me to the disposal facility name below and was discharged. I certify under penalty of perjury that the foregoing is true and correct:

Signature of authorized agent and title: _____

5.0 Transporting the Septage to and From the Disposal Site

- Vacuum truck drivers are responsible for all rules of the road
- Take the most expedient rout to the disposal site considering traffic flows
- Plan your trip to arrive at the disposal site within the specified disposal site operating hours (8 AM to 4:30 PM)
- In the event of an accident or moving violation (citation), cooperate with local authorities. Be prepared to show drivers license, vehicle registration, and insurance if requested. A complete report will be required and all incidents should be investigated.



Operator Licensure

A good driver operates a safe truck!

Report equipment malfunctions or required repairs immediately to supervisors. Septage trucks are heavy vehicles requiring commercial operators' licenses. Ensure your license is up-to-date and of the proper classification.

5.1 At the Disposal Facility

- Position the truck so that the septage may be directed to the inlet chamber with only one length of hose
- Chock wheels and place parking break
- Open the valve and allow the septage to flow via gravity into the inlet tank
- When the tank is empty, disconnect hose, clean with water (directing stream into inlet tank), and replace in tool box



Use all safety precautions at disposal site and keep site clean

5.2 Back at the Yard

- Fuel the vehicle at the end of the shift
- Clean the truck inside and out
- Replenish tools as needed
- Submit the invoices and manifests to the yard manager

Practical Note (example from The Philippines): Philippines Sanitation codes require facilities for workers at septage management facilities to be kept sanitary and with proper fixtures:

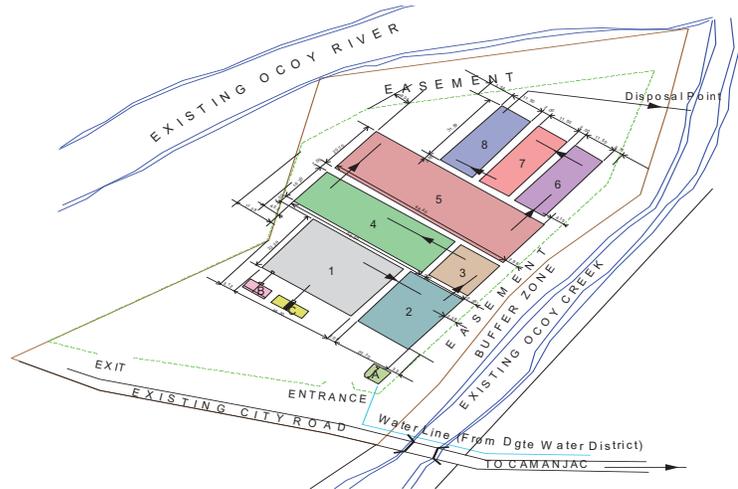
- 10.1.2.1 Hand washing facility (1)
- 10.1.2.2 Water closet (1)
- 10.1.2.3 Bathroom (1)
- 10.1.2.4 Drinking fountain (1)
- 10.1.2.5 Utility sink (1)
- 10.1.2.6 Ventilation and lighting
- 10.1.2.7 Flooring & walls shall be made of impervious materials
- 10.1.2.8 All appurtenant plumbing fixtures shall be in accordance with standard of National Plumbing Code (R.A. 1378)
- 10.1.2.9 Provisions for soap, mirror and any approved hand-drying material.
- 10.1.2.10 There shall be adequate and separate change rooms for both male and female users with individual lockers for clothes and personal belongings. The change room shall have a space requirement of at least 1.9 m²/user.

6.0 Septage Treatment and Disposal

Septage may be treated in a natural or mechanized treatment facility or may be processed by means of composting or lime treatment. The goal of these treatment methods is to stabilize the septage by killing the pathogens present and removing excess water. Once stabilized, the treated septage may be disposed of by land application (described in more detail below), landfilled, or used as a soil amendment.

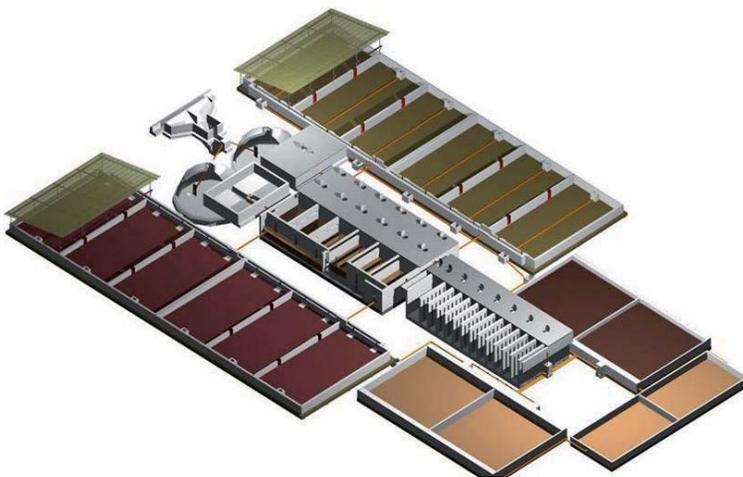
6.1 Lagoon Treatment

The City of Dumaguete, Philippines is developing a septage treatment facility based on sewage lagoon technology. Utilizing a combination of anaerobic and aerobic lagoons plus maturation ponds and constructed wetlands, the Dumaguete system will treat septage with no requirement for energy or chemical inputs. In this system, the majority of the BOD and TSS removal from the incoming septage will occur in the anaerobic process that takes place in the first set of lagoons. These anaerobic lagoons are 3 meters deep and will provide 60 days of detention time, which should be adequate for a removal efficiency of 60% to 75%. From the anaerobic lagoon cells, the effluent will flow through facultative lagoons, where both anaerobic and aerobic bacteria will consume much of the remaining organic material in the water. The final cells will provide effluent polishing so that what remains may be discharged into the Ocoy River.



While sewage lagoons are relatively inexpensive to construct and operate, they do require much more land space than mechanized septage treatment facilities. In areas where land is inexpensive and abundant and systems can be located well away from population centers, sewage lagoons should be considered for septage management activities.

6.2 Integrated Septage Treatment Facility, Aceh, Indonesia



BORDA's Integrated septage treatment facility at Aceh, Indonesia

A major septage treatment facility in Aceh, Indonesia has recently been constructed with the assistance of the Bremen Overseas Research and Development Authority (BORDA). This project combines several technologies including anaerobic digestions, biogas generation, sludge drying and constructed wetlands to accomplish septage treatment and reuse, hence the designation "integrated". This system came on line on June 22, 2006. The city's mayor, Drs. Razaly Yusuf, Banda Aceh's sanitation chief,

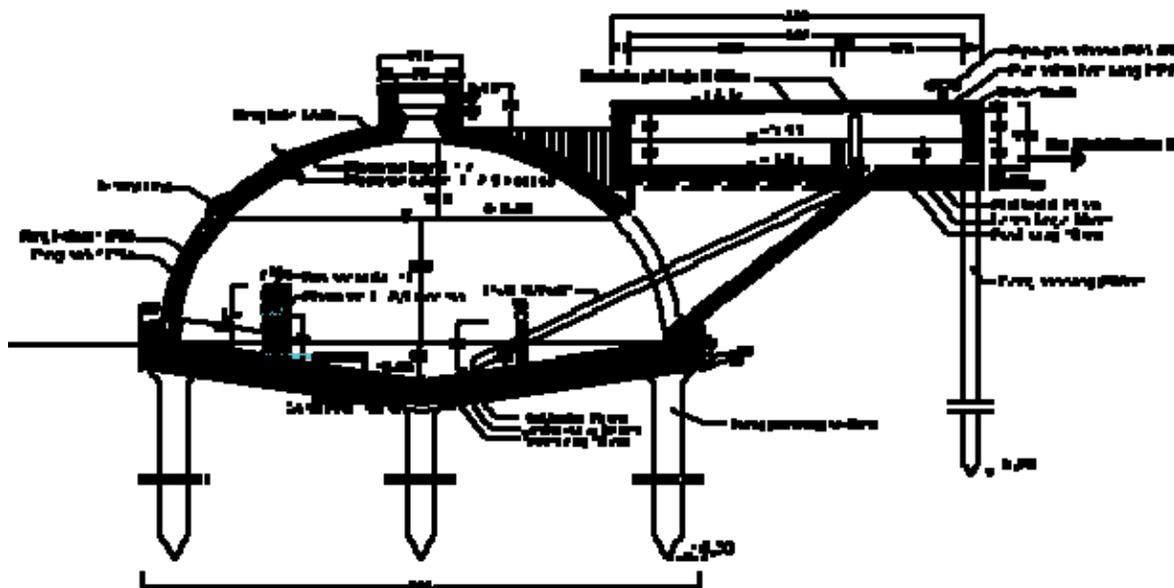
T. Saifuddin, and UNICEF Aceh's Head of Office, Edouard Beigbeder, jointly began the groundbreaking of the plant. The plant will treat up to 60 cubic meters of septage sludge every day from the region with most of the waste coming from the City's of Banda Aceh and Aceh Besar with a total population of approximately 250,000 population.

The plant processes septage sludge in several stages, producing a final effluent that is safe to discharge into the sea. At the first stage, biogas is extracted from the waste. This will be utilized to provide alternative lighting sources within the plant area and for cooking limited to the operator purposes. At the second stage, the sludge moves to series of drying beds. There, a large amount is removed in form of compost, which will be sold and used for farming. The remaining effluent is to be treated in a series of anaerobic reactors, through a gravel filter, and led into a maturation pond. This results in a final outflow which is safely discharged into the sea.

UNICEF worked closely with GTZ (German Technical Cooperation Agency), BALIFOKUS (an Indonesian NGO working in the area of environmentally-friendly water and sanitation projects) and BORDA (Bremen Overseas Research and Development Agency, NGO based in Germany) on this project. Residents of Banda Aceh City and Aceh Besar Regency will be able to use the plant by buying tokens after which a truck will arrive to collect their waste.

6.3 Waste to Energy

At the heart of the Aceh plant are two Chinese-dome biogas reactors, which will generate enough biogas to run the facility and supply surplus energy to neighboring buildings. Septage is a great source of biogas, as it is very high in organic matter that releases methane upon anaerobic digestion. By capturing and sequestering these greenhouse gasses before they can reach the atmosphere, such systems minimize impacts on global warming. Indeed, biogas waste-to-energy systems can actually sell carbon credits on the open market, which may help recover capital or operation costs associated with the facility. Capturing biogas is also beneficial because anaerobic digestion and the



Chinese dome bioreactor at the heart of septage management facility, Aceh, Indonesia (Courtesy BORDA)

biogases produced from this process can generate odors. Covering and capturing biogas helps control odor making these facilities more appropriate in areas that are in close proximity to residential housing.

6.4 Composting

Composting is another popular method of treating septage. Compost is defined as “the stabilization of organic material through the process of aerobic, thermophilic decomposition.” During the composting process organic material undergoes biological degradation to a stable end product. Approximately 20% to 30% of the organic solids are converted to carbon dioxide and water. As the organic material in the septage decomposes, the compost heats to temperatures in the range of 50 to 70 degrees Centigrade (°C) and harmful pathogens are destroyed. The resulting humus-like material is suitable as a soil conditioner and source of nitrogen and phosphorus.

Septage can be composted directly. The basic procedure for composting is as follows:

1. Septage or wastewater solids are mixed with a bulking agent (e.g. wood chips, sawdust) to decrease moisture content of the mixture, increase porosity, and assure aerobic conditions during composting.
2. The mixture is aerated either by the addition of air (“aerated static pile”) or by mechanical turning (“agitated”) for about 28 days.

The most common “agitated” method is windrow composting: the mixture of septage or wastewater solids and bulking agent is pushed into long parallel rows called “windrows”, about 1 to 2 meters high and about 2 to 4.5 meters at the base. The cross-section is either trapezoidal or triangular. Several times a week the mixture is turned over. Although specialized equipment has been developed for windrow composting, it is possible to use a front-end loader to move, push, stack, and turn the mixture.

Factors affecting the composting process include moisture content (40% to 60%); oxygen (5% to 15%); temperature (must reach 55 to 65 °C); pH (6 to 9); and carbon-to-nitrogen ratio (30 to 1).

For effective operations there should be sufficient laboratory equipment to monitor these parameters during the compost process. Moisture can be added and turning can be increased based on monitoring results. The operator should measure temperature at least once per day by placing a thermometer into the mixture at various locations. Maintaining temperature of 50 to 60 °C for the compost period assures destruction of pathogens.

Co-composting septage or wastewater solids with the organic fraction of municipal solid waste is possible. The organic fraction includes food wastes, paper, yard-wastes (e.g. leaves, branches, shrubbery, etc. cut or removed during landscaping). The MSW serves as the bulking agent.

6.5 Reuse Options for Compost and Processed Septage

Compost from septage or wastewater solids can be used as a soil amendment to reclaim land or used in landscaping or horticulture. Agricultural use or use that may include human contact (e.g. at parks or playgrounds) requires detailed laboratory analysis to confirm concentrations of pathogens and heavy metals are within safe limits. In order to produce treated septage of suitable quality for soil amendments, limiting septage collection to residential housing is required. Commercial septage

(including that from restaurants, fueling stations, auto repair shops, dentistry offices and jewelry shops, dry cleaning and film processing operations, and other manufacturing or industrial sources), must be segregated. Such commercial wastewater discharges often contain metals including mercury, lead, silver, and others that could render septage unsuitable for agricultural purposes.

6.6 Public Health Concerns

The primary public health concerns are exposure of workers, neighbors, and users to pathogens and bio-aerosols. Exposure can occur during the composting process to workers and to people living around the composting site.

6.7 Lime Stabilization

Lime stabilization is the process by which hydrated lime (calcium hydroxide) is added to septage to form a product that can be disposed of on land for use as a fertilizer. The process requires approximately 12 – 20 kilograms (25-45 pounds) of hydrated lime for every 4,000 liters (1000 gallons) of septage. Once the lime and septage are mixed, the pH is raised to 12 and held for a minimum of 30 minutes. This kills any pathogens present and “stabilizes” the septage, thus reducing odors. The material can then be more easily handled for final disposal. Several readings of pH during the mixing process must be taken to determine the exact amount of hydrated lime required.

There are two common ways to perform lime stabilization:

1. Adding the lime directly to the vacuum truck. Lime can be added either before or after the septage is pumped. The pump in the truck can then be used to mix the lime and septage. (NOTE: only use this method with stainless steel tanks.)
2. Adding the lime to the septage pit daily or weekly. The frequency of adding lime depends on the quantity of septage. If under 20,000 liters per week, adding lime weekly is sufficient. If over 20,000 liters per week, adding lime daily and mixing daily is required.

NOTE: Never add the lime directly to the septic tank as it will kill the beneficial bacteria that are responsible for treating the sewage.

6.8 The Lime Stabilization Pit

A simple earthen pit works well for lime stabilization. Typical pits are 3 meters wide, 4 meters long and 1.5 meters deep, and holds almost 40,000 liters of septage per pit. Two pits would be recommended for long-term operation. As one is filled, the other can be emptied. Typically the pits would be lined with 30 or 40 ml plastic. If the soils contain sufficient amounts of clay, the clay may be compacted to prevent seepage and save the cost of the lining.

Practical Notes: Lime stabilization septage pits are effective temporary measures for local governments that are planning for permanent septage facilities. Lime pits are cheap and easy to install and operate. For lime stabilization, mix the lime thoroughly by using the pump in the vacuum truck to discharge the septage under pressure to the pit. This is an easy and effective way to mix the septage with the lime.

6.9 Land Application

Stabilized septage can be applied to the land at a rate of 300,000 liters per hectare per year (30,000 gallons per acre). It can also be used as cover for sanitary landfills. Caution must be exercised however, as septage may contain heavy metals, depending upon the source of the septage. Testing the septage for metals is recommended to make sure the concentrations do not exceed the limits shown in Table 1, to the right.

Table 1. Typical Concentrations of Pollutants in Residential Septage. (Domestic Septage Regulatory Guidance, EPA-832-B-92-005 September

Pollutant	Average concentration of dry weight (mg/kg) ¹
Arsenic	4
Cadmium	4
Chromium	14
Copper	140
Lead	35
Mercury	0.15
Molybdenum ²	Less than 4
Nickel	15
Selenium	2
Zinc	290
Nitrogen	2 percent
Phosphorus	Less than 1 percent
Total solids	3.4 percent
pH	6 to 7 pH units

¹Other units as noted.

²Estimate based on relative ratio of data in the 1988 National Sewage Sludge Survey (NSSS), U.S. Environmental Protection Agency (EPA), October 1989.

6.10 Safety for Septage Treatment and Disposal Operators

Septage is biologically active material that must be handled with care. Always use good hygienic practices when handling or working with septage. When using the lime stabilization method, follow the recommendations below:

1. Avoid contact with skin or eyes to avoid severe burns.
2. Keep bags of hydrated lime dry. A wet bag can start a fire.
3. Do not put water on a fire involving hydrate lime. The water will react with the hydrated lime and cause it to release more heat.

The following safety equipment should be used when handling quicklime:

- Safety goggles;
- Half-mask respirator with cartridge;
- Shoulder-length, fully coated neoprene gloves;
- Emergency eyewash, in case lime gets on the face or in the eyes; and
- Carbon dioxide fire extinguisher, in the event of a fire.

More Information: The following links provide additional information on the process of lime stabilization and land application.

- <http://muextension.missouri.edu/xplor/envqual/wq0422.htm>
- http://www.nesc.wvu.edu/nsfc/pdf/eti/Septage_tech.pdf

7.0 Full Cost Recovery

Septage management programs should be funded from user fees to be sustainable. This is often a fee added to the monthly water bill or property tax, or could be a special municipal environment fee or pay-as-you-use program. Fees should be based on the actual of performing the service and include cost of staff, vehicle and fuel, treatment and disposal facilities, operation, maintenance and depreciation.

An example of a user fee funded septage program is presented from the planned Nuwara Eliya Septage Management Program. In this example, the Municipality of Nuwara Eliya, Sri Lanka wishes to upgrade

their existing septage program to provide greater services to its citizens. The existing program is reactionary. The municipality responds when someone calls with an overflowing septic tank. The plan by the Municipal Council is to improve septage services by increasing the capacity of the existing septage treatment facility, purchasing a new septage pumping vehicle, and fund new staff. The details of th

Nuwara Eliya Septage Management Program	
Cost Estimate	
Assumptions	
4000	number of homes
\$20,000	Cost for upgrade to septage treatment facility
\$50,000	Cost for new gully sucker equipment
\$10,000	Cost of annual operations of program
10%	Annual Interest with financing over 10 years
110	Number of Rupees per \$1 US dollar
\$70,000	Capital Cost for equipment
\$7,000	Capital Cost for equipment on annual basis
\$7,000	Interest payment (annual) - based on simple interest computation
\$14,000	Debt service -
\$24,000	Total cost of program per year
\$6	Cost per home per year
660	Rupees per year
55	Rupees per month per home

Sample spreadsheet showing full cost recovery for upgrades to the treatment facility and a new septage truck for only 55 rupees (\$.050) per month per family.

Note that for the 4,000 homes, the cost of financing the new disposal capacity, new septage vehicle, additional staff plus the cost of the interest is approximately 55 Rupees per month (about 50 US cents per household per month).

Another example can be found in Marikina City, Philippines. Manila Water Company, the service provider, will purchase eight new septage pumping trucks and fund a mechanized treatment facility in exchange for a 10% surcharge added to the monthly water bill. The program will fund septage pumping of 55,547 septic tanks every 5.25 years based on the following schedule, which shows the first two years of service:

Barangay	2007		No. of Months	2006												2007												2008											
	Population	Households		dec	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	jan	feb									
1 Fortune			0																																				
2 Industrial Valley	15373	38835	4																																				
3 San Roque	20728	17506	6																																				
4 Calumpang	16739	05024	4																																				
5 Jesus De la Pena	11267	58797	3																																				
6 Barangka	22390	2478	6																																				
7 Malanday	4803	3303	13																																				
8 Nangka	37121	15829	4583																																				
9 Concepcion Uno	88263	53927	10897																																				
10 Paring	75454	1963	8439																																				
11 Concepcion Dos	27427	07587	3386																																				
12 Santo Nino	31748	46501	3920																																				
13 Santa Elena (Pob)	6560	874009	810																																				
14 Tandang	10900	86672	1346																																				
15 Marikina Heights	36355	10954	4488																																				
	449932	8693	55547																																				

Spreadsheet showing the septic tank desludging schedule for Marikina City. Manila Water (concessionaire) will empty 90,000 septic tanks over a 5 year cycle. The first two years of the schedule are presented above. Local governments should plan similarly for their septage programs

8.0 Social Marketing – Driving the Desire for Improved Sanitation

Social marketing is the systematic application of marketing alongside other concepts and techniques to achieve specific behavioral goals for a social good. In this case, the social good is improved sanitation. There are defined steps in a social marketing campaign, including surveying for existing perceptions, meeting with stakeholders and developing technical committees, developing outreach tools for various media outlets, pre-testing the tools, deploying the messages and performing final surveys to gauge results. An example is the social marketing and outreach campaign in Muntinlupa City, Philippines for their public market wastewater system.



*“Clean your septic tank or swallow the consequences”
Output from social marketing campaign – Muntinlupa
City, Phil.*

Awareness of sanitation and wastewater treatment issues is very low throughout the South and South East Asia and must be elevated to build support for pilot projects and willingness to pay required user’s fees. Social marketing uses commercial marketing and advertising techniques to get people’s attention, communicate a set of discreet, easily understood messages and encourage them to take a specific action or change a behavior, such as urging people to have their septic tanks desludged.

In Muntinlupa, the city and the technical team developed a campaign plan with target audiences and messages and then developed a mascot, fliers, posters, newspaper ads and a video about the market treatment facility that was aired on a local cable TV station. They launched the campaign at a large shopping mall with an exhibit and event that featured a live mascot and back up dancers who put on a show and then handed out fliers. Meetings were also held with the market vendors’ association to discuss the project with them, answer their questions and get their support. The vendors welcomed the project because they take pride in the numerous awards the market has received, including Most Outstanding Healthy Market in the National Capital Region for 2003-2004 and *Huwarang Palengke sa 2004* (best market award).

Practical Notes: Effective social marketing and public awareness programs are most important for driving support for septage management programs. Multimedia campaigns and outreach efforts that move neighborhood by neighborhood just in advance of the desludging work can be most effective. Use flyers, posters, school plays and parades to get the message across. Gaining public support for septage programs minimizes complaints and maximizes compliance.

Appendix:
Septage Management Guidance Documents

The following pages are examples of comprehensive septage management guidance and general permit documents. They are examples taken from existing model programs that can be adopted for any local government.

**HAULED WASTEWATER DISCHARGE PERMIT
NUWARA ELIYA MUNICIPAL COUNCIL
SOLID WASTE MANAGEMENT FACILITY**

Permit ID # _____

In accordance with all the terms and conditions of the current Nuwara Eliya Municipal Council Authority Rates, Rules and Regulations, the special permit conditions accompanying this permit, and all applicable rules, laws or regulations of the Country of Sri Lanka, permission is hereby granted to:

NAME OF PERMITTEE: _____

ADDRESS: _____

For the disposal of domestic septic tank or holding tank wastewater at the Nuwara Eliya Municipal Council Solid Waste Management Facility (sanitary landfill).

This Permit is based on information provided in the Hauled Wastewater Discharge Permit application which together with the conditions and requirements contained in Attachments A and B constitute the Hauled Wastewater Discharge Permit. This Permit is effective for the period set forth below, may be suspended or revoked for Permit Condition Non Compliance and is not transferable

The original permit shall be kept on file in the Permittee's office. A copy of this Permit shall be carried in every registered vehicle used by the permittee.

EFFECTIVE DATE: May 1, 2007

EXPIRATION DATE: APRIL 30, 2008

CHECK IF RENEWED PERMIT

Appendix 2

HAULED WASTEWATER DISCHARGE PERMIT PROGRAM GUIDANCE AND GENERAL PERMIT CONDITIONS

VIOLATION OF ANY OF THESE PERMIT CONDITIONS CAN RESULT IN THE SUSPENSION OR REVOCATION OF THE PERMITTEE'S DISPOSAL PRIVILEGES

1. **INTRODUCTION:** The Nuwara Eliya Municipal Council (NEMC) has established a program to provide for the environmentally safe, cost effective and convenient disposal of septic and holding tank wastewater. Recognizing that the acceptance of hauled wastewater presents certain risks including plant upsets and sludge contamination, NEMC has developed these guidelines to minimize those risks and protect its facilities and personnel.
2. **TYPES OF WASTEWATER ACCEPTED:** In general, any wastewater that is 1) nontoxic to the biological septage treatment and disposal system and 2) has no adverse impact on the operation and maintenance of that system is considered acceptable for discharge to the facility. Hauled wastewater can be categorized into three categories:
 - a. **Normally Acceptable Wastewaters:**
 - Residential Septic Tanks
 - Residential Holding Tanks
 - Commercial holding/septic tanks used for domestic type sanitary wastewater (non-process wastewater)
 - b. **Conditionally Acceptable Wastewaters, Prior Approval Required (Considered on a case by case basis)**
 - Industrial and commercial process wastewaters
 - Municipal sludges if they are from biological processes and meet all local and Sri Lanka Guidelines for Agricultural use
 - Special Wastewaters such as leachates, condensates, wash waters and other loads deemed to be toxic

Any wastes considered to be flammable, explosive, corrosive or containing levels of chemicals, fats oils and grease at greater concentrations than normally found in domestic wastewater

In all cases, the NEMC reserves the unconditional right to accept or reject any hauled wastewater as it deems necessary to protect its employees, facilities or treatment processes. Any NEMC employee may unconditionally refuse to accept a load or stop and unloading in progress in the event a suspected violation of these rules.

3. **ADMINISTRATIVE PROCEDURES:** All haulers are required to obtain a Hauled Wastewater Discharge Permit (HWD permit) before discharging wastewater at the NEMC sanitary landfill. Permits will be issued to haulers that meet the following conditions:

- Submit a completed NEMC Permit Application Form with proof of vehicle ownership and insurance and the current HWD permit application fee.
- For permit renewals, haulers must have a record of satisfactory compliance with all conditions and requirements of the expiring HWD permit.

Permits will be issued for a term of one year. Haulers who have satisfactorily operated within all the conditions of their HWD permit may submit an application for permit renewal along with the current HWD permit application fee.

4. **MANIFESTS:** Haulers must complete and return to NEMC a Hauled Wastewater (HW) Manifest for each source of wastewater on a truck load. All pump outs require a completed HW Manifest including:

- Section 1: Wastewater Stream Identification – Indicating volume (in liters), type, source of hauled wastewater
- Section 2: Generator of Wastewater – Indicating name, complete address, and telephone number for all pump outs. Any wastewater that does not originate in a single family residence must also include the generator's signature
- Section 3: Hauler of Wastewater – Indicating company name, HWD Permit number, vehicle license number, pump out date, and signature
- Section 4: Acceptance by NEMC – A NEMC representative must sign the HW manifest for any load of wastewater discharged at the sanitary landfill. A copy of the HW Manifest must be left at the NEMC sanitary landfill.

5. **FEES:** The following fees are utilized in the hauled wastewater acceptance program. The actual fee is set forth in the Rate Schedule of the most current edition of the NEMC Rates, Rules and Regulations (RR&R).

- Permit Application Fee
- Permit Renewal Application Fee
- Disposal Fee
- Laboratory Analysis Fee

The disposal fee is a rate per 1,000 liters of hauled wastewater as set forth in the NEMC RR&R Rate Schedule. Charges for disposal will be based on this rate, multiplied by the registered usable capacity of a vehicle. Regardless of the volume of hauled wastewater accepted, charges will be assessed on full tank load capacity only. Partial loads will be considered as full loads. Fees for the laboratory analysis of any wastewater will be made in accordance with the current edition of the NEMC RR&R Rate Schedule.

6. **COMPLIANCE:** An HWD permit and the associated disposal privileges may be suspended or revoked immediately for any violation of the HWD permit conditions

Appendix 3

HAULED WASTEWATER DISCHARGE PERMIT SPECIFIC PERMIT CONDITIONS

VIOLATION OF ANY OF THESE PERMIT CONDITIONS CAN RESULT IN THE SUSPENSION OR REVOCAION OF THE PERMITTEE'S DISPOSAL PRIVILEGES

1. Hauled wastewater will be accepted from 8:30 am until 4:30 pm, Monday through Friday and from 9:00 am – 3:00 pm on Saturday. The sanitary landfill will be closed on all public holidays and no wastewater will be accepted.
2. Haulers shall discharge their loads by discharging directly to the wastewater inlet sump. Any hoses or additional fittings required for haulers to discharge will be provided by the hauler.
3. Care shall be taken when connecting, disconnecting or unloading to prevent the spillage of any materials around the hauled wastewater acceptance stations. It is the responsibility of the Permittee and their employees to leave the hauled wastewater acceptance station in a satisfactory condition. If necessary, the area shall be washed down by the Permittee or their employees before departing the site.
4. The original Hauled Wastewater Discharge Permit shall be kept in the owner's office file. Each registered hauling vehicle shall carry a copy of the Permit at all times. A NEMC representative may request to see the permit at any time.
5. All Permittees shall use a NEMC Hauled Wastewater (HW) Manifest for each pump out. All pump outs must include completed HW Manifest including:
 - Section 1: Wastewater Stream Identification – Indicating volume (in liters), type, source of hauled wastewater
 - Section 2: Generator of Wastewater – Indicating name, complete address, and telephone number for all pump outs. Any wastewater that does not originate in a single family residence must also include the generator's signature
 - Section 3: Hauler of Wastewater – Indicating company name, HWD Permit number, vehicle license number, pump out date, and signature
 - Section 4: Acceptance by NEMC – A NEMC representative must sign the HW manifest for any conditionally approved loads. A copy of the HW Manifest must be left at the NEMC sanitary landfill.

All manifests must be received by NEMC staff who will sign, date and timestamp the manifest.

6. A NEMC representative may request information concerning the origin, and nature of the contents of any registered vehicle. In addition, the Permittee shall allow the NEMC to immediately obtain a sample of the wastewater from any vehicle. The Permittee shall comply with all information requests concerning the load. This may include but is not limited to the following information: pick up points, volumes, and wastewater characteristics.

7. This permit shall be valid only when all other local or Sri Lanka permits required by the Permittee for the transporting wastewaters are valid and current. In addition, the Permittee's vehicle insurance shall be kept current. Expired vehicle insurance coverage will result in the suspension of disposal privileges.

8. The Permittee shall immediately report in writing to the NEMC any changes in business name, ownership, address/telephone number, and registered vehicles. Changes to the vehicles include but are not limited to: the modification of previously registered vehicles, the addition of vehicles, or the deletion of vehicles.

9. In the case of multiple pump-outs included as one vehicle load, any part of the load that is prohibited or restricted shall constitute an entire load that is unacceptable for discharge.

10. The NEMC reserves the unconditional right to refuse acceptance of any load or stop an unloading operation in progress at any time, should it become apparent that the wastewater is of deleterious nature to cause harm to equipment, facilities or personnel.

11. All vehicles used by the Permittee to haul wastewater shall be registered with NEMC. Any vehicle additions, deletions or modifications shall immediately be reported in writing to the NEMC. The written notification shall include vehicle license number, make and model of vehicle, tank capacity and the nature of the modifications. The use of a registered hauled wastewater vehicle for the transportation or storage of hazardous materials, liquid petroleum fuels, waste oil, petroleum derivatives wastes or corrosives is specifically prohibited.

12. The discharge of any unacceptable materials as defined in the NEMC Rates, Rules and Regulations is specifically prohibited. These wastes include but are not limited to: flammables, explosives, corrosives, or wastewaters with unacceptable levels of metals, solvents or other chemicals. Any violation on the part of the Permittee or their representatives with the conditions of this permit or any portion of the Authority's Rates, Rules and Regulations shall be cause for immediate suspension or revocation of the HW permit and associated disposal privileges. In addition, such violations shall be cause for legal prosecution by the NEMC under prevailing law.

13. The disposal fee shall be based on the current rate per 1000 liters (as set forth in the latest edition of the NEMC rate schedule). Charges will be based on vehicle capacity. All loads shall be considered and charges as full loads.

14. Portable toilet wastewater is considered to be conditionally acceptable hauled wastewater. Under no circumstances will these wastewaters be accepted if they contain any formalin or formaldehyde based deodorizers.

15. Invoices will be prepared at the beginning of each month for the previous month's disposal charges and will be due within 25 days. A 5% delinquent payment charge will be added to any invoices unpaid by the due date.

Appendix 4: Sample Septic Permit Application Form

APPLICATION & PERMIT FOR SEWAGE DISPOSAL SYSTEM

(Sample Municipality)
ENVIRONMENTAL MANAGEMENT DEPARTMENT

JOB LOCATION (Please fill form out completely)

Street Address: _____ City: _____ Zip: _____
 Parcel Number: _____ Cross Street: _____ Subdivision: _____
 Property Owner: _____ Phone Number: _____
 Mailing Address: _____

DESIGN INFORMATION

New Repair Destruction Other
 If Repair, What is Existing System? _____
 If Other, Explain _____
 Number of Bedrooms _____ Or liters per Day _____ Commercial Use _____
 Single Family Mobile Home Other If Other, Explain _____
 Private Well Public Water Soil Studies Date _____ By _____
 (Perc Test, Test Drill)

INSTALLATION

Septic Tank: New Existing Size: _____ gallons Tank Pumped: Yes No
 Leaching Pits: Number _____ Feet Diameter _____ meters
 _____ Deep _____
 Deep Trench: Leach Line: Total Leach Field Length _____ Lineal Feet
 Width _____ Feet Depth _____ Feet
 Other (i.e., Mound, Sand Filter, Press Dosed, etc.) submit specifications

PLOT PLAN

PROVIDE A PLOT ON PLAN SHEET AND ATTACH.

I HEREBY CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND CORRECT AND THAT THE PROPOSED WORK WILL BE DONE TO MEET THE REQUIREMENTS OF SACRAMENTO COUNTY CODE, CHAPTER 6.32 AND ALL REGULATIONS OF THE COUNTY HEALTH OFFICER. A FEE FOR THE SEWAGE DISPOSAL SYSTEM PERMIT IS SUBMITTED HERewith. THIS PERMIT WILL EXPIRE ONE YEAR FROM DATE OF ISSUE. I AGREE TO NOTIFY WATER PROTECTION DIVISION 24 HOURS IN ADVANCE FOR FINAL INSPECTION.

Signature: _____ Contractor
 Print Name or Company Name: _____ Owner
 Phone number: _____ Date: _____
 License number: _____ License Type: _____

FOR OFFICE USE ONLY			
Date: _____	Receipt #: _____	Fee Paid: \$ _____	Permit #: _____
Approved by: _____		Date: _____	Date Issued: _____
Finaled by: _____		Date: _____	Onsite #: _____
Reinspection by: _____		Date(s): _____	GPS: _____
Comments: _____			

Appendix 5: Sample Septage Ordinance

ORDINANCE No. _____
Series of 2007

ORDINANCE ESTABLISHING A SEPTAGE and SEWAGE MANAGEMENT PROGRAM IN MARIKINA CITY

WHEREAS, the City government of Marikina is continuously striving to raise the environmental standards for water and sanitation.

WHEREAS, Section 20 of the Clean Water Act (RA 9275), imposes that, “LGU shall share respectively in the management and improvement of water quality within their territorial jurisdiction”;

WHEREAS, almost all residences, institutions, commercial and industrial establishments in the city use septic tanks for wastewater treatment and disposal;

WHEREAS, most of these septic tanks have been constructed many years ago and may not be properly designed and maintained which contributes much to our wastewater problems;

WHEREAS, existing laws pertaining to wastewater management need effective enforcement mechanisms for proper implementation.

NOW THEREFORE, BE IT ORDAINED, AS IT IS HEREBY ORDAINED, by the CITY COUNCIL OF MARIKINA, in session duly assembled;

SECTION 1. SCOPE. This ordinance shall apply to all buildings and structures whether public or private, residential, commercial, institutional, industrial or residential, proposed/planned or existing.

SECTION 2. AUTHORITY. This Ordinance is the enabling act for the implementation of the provisions and specifications of the following laws:

- a. The National Building Code of the Philippines
- b. The Sanitation Code of the Philippines
- c. The Plumbing Code of the Philippines
- d. The Clean Water Act

SECTION 3. DEFINITION OF TERMS. As used in this ordinance, the terms below shall be defined as follows:

3.1. Baffle – a device (as a wall or screen) to deflect, check or regulate the flow of sewage and septage.

3.2 CENRO – City Environment and Natural Resources Officer

3.3. Discharge – includes but not limited to, the act of spilling, leaking, pumping, pouring, emitting, capturing, releasing or dumping of any material into a water body or onto land which might flow or drain into said water.

3.4. Desludging – process of removing accumulated sludge or septage from the septic tank.

3.5. Effluent – means discharge from known sources which is passed into a body of water or land, or wastewater flowing out of a manufacturing plant, including domestic, commercial and recreational facilities.

3.6. Domestic sewage – sewage containing human excrement and liquid household waste.

3.7. Master Plumber – an individual who is licensed and authorized to install and assume responsibility for contractual agreements pertaining to plumbing and to secure any required permits.

3.8. Septage – the sludge produced on individual onsite wastewater disposal systems, principally septic tanks and cesspools.

3.9. Scum – a slime or filing covering on the surface of the liquid in the septic tank.

3.10. Septic Tank – a water-tight receptacle which receives the discharge of a plumbing system or part thereof, and is designed to accomplish the partial removal and digestion of the suspended solid matter in the sewage through a period of detention.

3.11. Sewage – means water-borne human or animal wastes, excluding oil or oil wastes, removed from residences, buildings, institutions, industrial and commercial establishments together with such ground water, surface water and storm water as may be present.

3.12. Sewerage – includes, but not limited to, any system or network of pipeline, ditches, channels, or conduits including pumping stations, lift stations, and force mains, service connections, including other constructions, devices and appliances appurtenant thereto, which includes the collection, transport, pumping and treatment of sewage to a point disposal.

3.13. Sludge – any solid, semi-solid or liquid waste or residue generated from a wastewater treatment plant, water supply treatment plant, or water pollution control facility, or any other such waste having similar characteristics and effects.

3.14. Structure – that which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

3.15. Sanitary Engineer – a person duly registered with the Board of Examiners for Sanitary Engineer (RA 1364)

3.16. Treatment – any method, technique, or process designed to alter the physical, chemical, or biological and radiological character or compositions of any waste or wastewater to reduce or prevent pollution.

3.17. Wastewater – waste in liquid state containing pollutants.

3.18. Water Quality – means the characteristics of water, which define its use in characteristics by terms of physical, chemical, biological, bacteriological or radiological characteristics by which the acceptability of water is evaluated.

SECTION 4. GENERAL DESIGN, CONSTRUCTION AND MAINTENANCE REQUIREMENTS OF SEPTIC TANKS

4.1. The general design, construction and maintenance requirements of septic tanks shall be in accordance with the provisions of the Plumbing Code of the Philippines specifically section 4 of its Implementing Rules and Regulations, the National Building Code of the Philippines and its related codes.

4.2. The septic tank shall be designed to be the depository of all wastewater generated within the building or structure.

SECTION 5. SEPTIC TANK MAINTENANCE

Section 5.1. Mandatory desludging of Septic tanks is every 3-7 years (in coordination with MWSS concessionaire) of all buildings/structures contained under this Ordinance.

SECTION 6. PERMITTING

Section 6.1. Septic tanks for industrial, commercial, institutional and residential must be designed by a Sanitary Engineer or Master plumber as the case may be.

Section 6.3. Upon the completion of the construction of the septic tank, the covering shall be done only in the presence of a building inspector under the Septage Management Unit. The proof or certificate of inspection shall be part of the requirements in the issuance of the Occupancy Permit.

SECTION 7. SLUDGE DISPOSAL

Section 7.1. Disposal of sludge must be done by any DOH/DENR accredited individuals, companies, private or public in any DOH/DENR-approved disposal facility. Sludge materials shall not be included in our local waste collection system.

Section 7.2. All entities under this Ordinance upon or after inspection, shall present a proof of desludging (Desludging Certificate) to avoid penalties thereof.

SECTION 8. WATER QUALITY STANDARDS

Section 8.1 For verification purposes, all wastewater effluents may undergo actual sampling and must be subjected to the existing Rules and Regulations of DENR as per DENR Administrative Orders No. 35, s. of 1990 and DAO No. 34, s. of 1990, for surface water.

Section 8.2. Pretreatment for Commercial Facilities. Wastewater from a commercial or other non-residential facility is acceptable if the septic tank only receives wastewater typical of household (i.e. from toilet and sinks). If the wastewater contains substances of a commercial nature such as oil or fuel residue, metals or high volumes of fats or grease, an appropriate pretreatment program, approved by the CENRO, must be in place.

SECTION 9. COMMUNAL SYSTEM

Section 9.1. Communal septic tanks shall follow the specifications as to location, design and construction requirements as provided for under Section 5 of this Ordinance.

Section 9.2. Communal effluent system shall be under the guidelines provided for by the LLDA/DENR.

Section 9.3. Communal septic tanks shall be required to housing areas where individual lot area is less than fifty (50) square meters.

SECTION 10. INDUSTRIAL ESTABLISHMENTS

All industrial establishments are required to submit or present the latest Discharge Permit issued by the LLDA. The Environmental Compliance Certificate shall also be Required.

SECTION 11. SUBDIVISIONS

Section 11.1. All subdivisions that will be developed during the effectivity of this Ordinance shall be required to install appropriate sewerage facilities including a wastewater treatment facility.

Section 11.2. Prior to the submission of the Subdivision plan to the City Council, it shall first be submitted to the Local Building Official for approval of the sewage disposal system.

Section 11.3. The plot shall contain all pertinent information relative to the installation of sewage disposal systems. Proper disposal of sewage in subdivisions shall conform with the provisions of this Ordinance.

SECTION 12. DESIGN AND CONSTRUCTION STANDARDS OF SEWER SYSTEMS

All designs, materials, installation requirements of a sanitary sewer must conform to the MWSS Design and Standards for Sanitary Sewer.

SECTION 13. ADMINISTRATION AND ENFORCEMENT

A Septage Management Unit shall be created under the Office of the City Building Official. (duties and responsibilities to be defined in the IRR).

Regulation and monitoring of wastewater discharge shall be undertaken by the City Environment and Solid Waste Management Office.

Septage collection, transport and disposal shall be regulated and monitored by the City Health Office.

SECTION 14. USER FEE

Upon establishment of a wastewater management program, for every area covered by wastewater treatment facilities, a user fee shall be charged for every entity serviced or covered by the said facilities..

SECTION 15. PENAL PROVISION

Any person or entity who shall violate any provision of this Ordinance shall be penalized as follows:

1. FOR BUILDINGS/STRUCTURES WITHOUT SEPTIC TANKS.....PhP5,000.00
2. FOR BUILDINGS/STRUCTURES WITH INCORRECT/IMPROPER SEPTIC TANK.....PhP5,000.00
3. FOR NOT MEETING THE STANDARDS SET FORTH BY THIS ORDINANCE.....PhP5,000.00
4. FOR IMPROPER SLUDGE DISPOSAL.....PhP5,000.00
5. FOR NOT REGULARLY DESLUDGING THEIR SEPTIC TANK/S.....PhP5,000.00
6. FOR NOT COMPLYING WITH THE PROCEDURAL REQUIREMENTS.....PhP 5,000.00

And/or imprisonment for a period of one (1) year or both at the discretion of the court.

SAMPLE