ON-SITE DOMESTIC WASTEWATER TREATMENT IN MALAYSIA

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INTRODUCTION OF ON-SITE TREATMENT SYSTEM IN MALAYSIA
OVERVIEW

Population: 29.24 mil (Urban, Rural)
Area: 330,252 sq. km.

MALAYSIA

Country at a Glance

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>29.24 million</td>
</tr>
<tr>
<td>GDP</td>
<td>$303.5 billion</td>
</tr>
<tr>
<td>GDP growth</td>
<td>5.6%</td>
</tr>
<tr>
<td>Inflation</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

Services sector is expected to grow at 7.2% annually until 2015

Average annual growth rate for 2011-15 period

<table>
<thead>
<tr>
<th>Sector</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>6.0%</td>
</tr>
<tr>
<td>Services</td>
<td>7.2%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>5.7%</td>
</tr>
<tr>
<td>Construction</td>
<td>3.7%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>3.3%</td>
</tr>
<tr>
<td>Mining</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Share to GDP in 2015

Source: 10th Malaysian Plan
EVOLUTION OF SANITATION IN MALAYSIA

Prior to 1950-s

Technology

Early Days in Malaya

1950-s

Primitive / Primary Treatment

(Address Public Health)

1960-s

Pour Flush

1970-s

Septic Tank

Partial / Full Secondary Treatment

(Address River Pollution)

1980-s

Imhoff Tank

OP/AL

Fully Mechanised Plant

1990-s

Activated Sludge / Biological Filters

2000

Future Tertiary Treatment

(Address Environment)
Population in Malaysia having access to sanitation in 2008

- Urban: 96%
- Rural: 95%
- Total: 96%

(Source: WHO)

Worldwide use of improved sanitation facilities in 2008
(Source: Progress Report on Sanitation and Drinking Water, 2010 Update, WHO & UNICEF)
ON-SITE AND OFF-SITE TREATMENT SYSTEM

Sewage Treatment System

Small Sewage Treatment System

Individual Septic Tank (include CST)

Cess pit
## SEWERAGE COVERAGE AREA IN MALAYSIA

### TYPES OF SERVICES AND APPLICATION

<table>
<thead>
<tr>
<th>Type of Services</th>
<th>Units (PE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OFF-SITE TREATMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Decentralized (Multipoint)</td>
<td>8,445 (17,209,749)</td>
</tr>
<tr>
<td>Centralized (Regional)</td>
<td>79 (6,034,593)</td>
</tr>
<tr>
<td><strong>ON-SITE TREATMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Individual Septic Tank</td>
<td>1,275,757 (6,608,560)</td>
</tr>
<tr>
<td>Communal Septic Tank (CST)</td>
<td>4,380 (528,875)</td>
</tr>
<tr>
<td>Small Sewage Treatment System</td>
<td>2400 (240,000)</td>
</tr>
<tr>
<td>Cess Pit (Pour Flush)</td>
<td>894,859 (4,474,293)</td>
</tr>
</tbody>
</table>

* Source: Malaysia Water Industry Guide 2013
Note: 1. Estimate installation of SSTS since year 2008
SEWERAGE COVERAGE AREA IN MALAYSIA

Off site treatment system can be divided into two major categories:

- **Private System**
  - 2,474 nos (2,555,558)

- **Public System**
  - 6,050 nos (20,688,784)
ON-SITE DOMESTIC TREATMENT
OVERVIEW

- **CESSPIT**: An old system (Obsolete system)
- **INDIVIDUAL SEPTIC TANK**: Serving single premises with capacity not more than 30PE
- **COMMUNAL SEPTIC TANK**: Obsolete system (serving multi premises)
- **SMALL SEWAGE TREATMENT SYSTEM**: Provide partial treatment

Type of on-site treatment system
Design standards stringent to achieve effluent quality if:
Discharge of treated effluent located upstream the catchment areas and/or in certain sensitive receiving watercourse.

Governed to a large extend by the hydraulic aspects of treated effluent discharge to suitable watercourse.
If location of the ground water in the premises to be built is moving towards the wellfield, even though premises is located outside the 200m radius, thus the premise effluent discharge must comply with the Standard A.
Diagram 1: Schematic Diagram of Septic Tank
**INDIVIDUAL SEPTIC TANK**

**DEFINITION**

Definition of septic tank based on Water Services Industry 2006 (Act 655):

“A basic form of on-site treatment facility consisting of one or more compartments that provides treatment of sewage by means of sedimentation and anaerobic process.”

**DESIGN CAPACITY**

For 5 – 30 PE (1.125 – 6.750 m³/day)

**APPLICATION**

Serving a single premise, with capacity not more than 30PE

Other treatment system shall be provided if the design PE more than 30PE.
INDIVIDUAL SEPTIC TANK

LIMITATION

Limitation in providing primary treatment

Treatment performance is inconsistent to meet the required standards

PERFORMANCE MEASUREMENT

Performance is subjected to retention which is affected by quantity of settled solids which accumulated over time

EFFLUENT QUALITY

Design for effluent discharge downstream of water intake points

Average effluent quality
- BOD: 50 mg/l
- Suspended Solid: 100 mg/l

MAINTENCE OF THE SYSTEM

Design shall allow regular desludging

Desludging shall be at least once every 3 years.
PLANNING ASPECT OF INDIVIDUAL SEPTIC TANK

**Single Development Up To 30 Units Or 150PE In Total**

- Septic tanks regarded as temporary treatment system
- Owner of system shall provide the following
  - 150mm by-pass pipe from last inspection chamber before septic tank
  - By pass pipe extended it to the drain outside the premises
  - The pipe shall be end capped for future connection

**Individual Development Outside The Local Authority Areas**

- Owners must be compelled to adhere to rules and requirement
- Product must be approved by SPAN
- Complying with determined effluent standard
- Trenches to be provided for final effluent discharge
- Raised soak away shall be provided if water table is high
- Desludging activities must be provided by registered desludging contractor

All soak away shall be located 5m downstream of wells for domestic consumption
Diagram 2: Schematic Diagram of SSTS
SMALL SEWERAGE TREATMENT SYSTEM

DESIGN CAPACITY For 31 – 149 PE
(6.975 – 33.525 m³/day)

TREATMENT PRINCIPLES:
- Limited to development with lower population size
- Additional aeration process at the second tank for removal of BOD
- Provide only a partial treatment
- Low energy consumption
- The function of key components does not require intensive energy and technical ability for operation
## SEWAGE CHARACTERISTICS AND EFFLUENT QUALITY

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>PE RANGE</th>
<th>CAPACITY RANGE (m³/day)</th>
<th>PARAMETER/CONCENTRATION (mg/l)</th>
<th>BOD</th>
<th>COD</th>
<th>SS</th>
<th>TN</th>
<th>NH3-N</th>
<th>Oil &amp; Grease</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(IDEAL) INFLUENT</strong></td>
<td>All</td>
<td>All</td>
<td></td>
<td>250</td>
<td>500</td>
<td>300</td>
<td>50</td>
<td>30</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td><strong>EFFLUENT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INDIVIDUAL SEPTIC TANK</strong></td>
<td>5 - 30</td>
<td>1.12 – 6.75</td>
<td></td>
<td>50</td>
<td>200</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>²SMALL SEWAGE TREATMENT SYSTEM</strong></td>
<td>31 - 149</td>
<td>6.97 – 33.52</td>
<td></td>
<td>35</td>
<td>160</td>
<td>75</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>7.5</td>
</tr>
</tbody>
</table>

**CHALLENGES IN DETERMINING THE DESIGN INFLUENT PARAMETERS**

The influent parameter in Malaysia mostly diluted due to infiltration and illegal discharges from rain gutter.

**Note:**

1. Only applicable for effluent discharge to stagnant water bodies such as lakes and ponds.
2. The proposed effluent parameters for SSTS.
ADVANTAGE & DISADVANTAGE OF ON-SITE TREATMENT SYSTEM

ADVANTAGES

- Low installation cost
- Easy installation
- Serving a single premise

DISADVANTAGE

- Inconsistent treatment performance
- Require regular desludging frequency of once every 3 years
- Capacity allowed only up to 30PE
- Lacking of Enforcement
CHALLENGES

Responsibility of desludging individual septic tank falls under the owner.

Prior to WSIA, mandatory scheduled desludging was in place.

Chart 2: Number of ISTs in Peninsular Malaysia and Federal Territories of Putrajaya and Labuan
DESLUDGING TREND IN MALAYSIA

AWARENESS PROGRAMME

KEY ISSUES

Unbearable stench permeating the air

Malfunctioning of toilets, sinks and sanitary pipes

Higher risk of being confronted with water borne diseases

Quality of water resource will be affected

Campaign being held through Malaysia to encourage Malaysian desludging their IST.

The message brought to public to address **key issues** and awareness in desludge their septic tanks:

- Unbearable stench permeating the air
- Malfunctioning of toilets, sinks and sanitary pipes
- Higher risk of being confronted with water borne diseases
- Quality of water resource will be affected
A substantial decline in exercise as shown

**CHART 1: INDIVIDUAL SEPTIC TANK (IST) DESLUDGING TREND (2005 - 2012)**

Before 2008, desludging contractors were more proactive in providing door to door notices, offering desludging services.

- **Expected no. of IST desludged per year = 434,196 nos. of IST desludged**
- **Actual no. of IST desludged per year = 70,170 nos. of IST desludged**
Two major contractors are licensed by SPAN to provide desludging services:

- **Indah Water Konsortium Berhad**
- **Majaari Services Sdn Bhd**

Desludging activities can only be carried out by Permit E contractor registered by SPAN.

### DESLUDGING TREND IN MALAYSIA

<table>
<thead>
<tr>
<th>PERMIT HOLDER</th>
<th>PERMIT</th>
<th>DESCRIPTION</th>
<th>NOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plumber</td>
<td>A</td>
<td>to carry out any construction of, connection of, modification of or repairs to water pipes and water fittings which convey or will convey water from the public mains</td>
<td>13,186</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>to carry out any works necessary to connect a private connection pipe to a sewer or sewage treatment works</td>
<td>941</td>
</tr>
<tr>
<td>Contractor</td>
<td>C</td>
<td>to carry out any construction of, installation of or modification to any part of a water supply or sewerage system</td>
<td>11,882</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>to carry out maintenance services for a water supply system or a sewerage system but which does not involve the operation of such system</td>
<td>8,683</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>to undertake, provide or make available sewerage desludging service</td>
<td>388</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>35,080</td>
</tr>
</tbody>
</table>
THANK YOU

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