OVERVIEW OF FECAL SLUDGE MANAGEMENT IN MALAYSIA

Ahmedabad, India

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Introduction

• Sewerage Service in Malaysia was privatized in 1994.

• The concession was given to Indah Water Konsortium (IWK) for a period of 28 years. Before privatisation, sewerage services were the responsibilities of local and city councils.

• IWK operates and maintains all public STPs and sewer networks within the service area covering the whole country except 3 states.

• To date, IWK is operating and maintaining 9,446 nos. of STP and 16,000 km of sewers with a total connected PE is 19.9 million.

• Water and Sewerage Industry Act (WSIA) came into force in 2008 to regulate water and sewerage services sector.
Governance Structure of Sewerage Services

Ministry of Finance

- 100% Equity
- Govt. Support
- Loan & Subsidy

Ministry of Energy, Green Technology & Water

Regulator of Sewerage Services

Policy & Control of National Sewerage Agenda

Indah Water

1. Sewerage Services
2. Operator in 88 Local Authority Areas.
4. Undertakes Refurbishment/Upgrading Projects Funded by Govt.

Ministry of Natural Resources & Environment

Regulator of Effluent Standards
Sewerage Treatment Progression

Prior to 1950-s

- Early Days in Malaya
  - Pour Flush
  - Septic Tank
  - Imhoff Tank

Technology

- 1950-s
  - Primitive / Primary Treatment
    - (Address Public Health)
- 1960-s
- 1970-s
  - Partial / Full Secondary Treatment
    - (Address River Pollution)
- 1980-s
- 1990-s
  - Activated Sludge / Biological Filters
- 2000
  - Fully Mechanised Plant
  - Future Tertiary Treatment
    - (Address Environment)
Desludging Service For Individual Septic Tanks, Pour Flush And Private Plants

- Indah Water Konsortium provides desludging services to septic tank customers or private plants or individual owners of sewage treatment systems.

- Approx. 1.22 million septic tanks (IST) within Indah Water Konsortium operational areas serving more than 6 million population.

- Approx. 826,388 nos. of pour flush, a basic sanitation system introduced back in 1960’s, serves about 4.1 population nationwide, majority in rural areas.

- Septic tank owners are required to desludge their tanks once in every three years failing which, untreated sewage and sludge solids will be released into rivers causing environmental problems.
Type of Desludging Services

- **Scheduled Desludging** - Services received by customers through scheduling done by IWK, once in every three years.

- **Demand Desludging** - Services received by customers upon request, 2 months before the due date for next cycle of desludging.

- **Repeat Desludging** - Services received by customers upon request within the period of 34 months from the last desludging date.

- **Responsive IST or Pour Flush Desludging** - Services requested by IST users outside IWK’s concession area or pour flush users.
Fecal Sludge

Definition

“Fecal sludge is the by-product of almost every method of treatment of wastewater”
Extent of Sludge Management Problems

Estimated Sludge Quantities in Malaysia
Fecal Sludge Sources

Individual Septic Tanks (IST) / Communal Septic Tanks (CST)

- Aerated Lagoon (AL) / Oxidation Pond (OP)

- Activated Sludge STPs
IST Desludging
Pond Desludging

1. Pumping of Sludge to Treatment Facility
2. Dried Sludge after Dewatering
3. Dried Sludge to be Disposed Off to an approved site
4. View of Pond after completion of Desludging Exercise
Technological Evolution of Fecal Sludge Treatment in Malaysia

- Trenching
- Sludge Lagoons
- Drying Beds
- Mobile Dewatering
- Mechanised Dewatering
- Filter Press
- Centralised Sludge Treatment Facility

Progress Improvements of Sludge Management
Sludge Dewatering Techniques

- Land Application: Trenching System
- Evaporation: Sludge Drying Beds, Sludge Lagoons
- Semi Mechanical: AVC System
- Mechanical: Belt Press, Filter Press, Centrifuge
Fecal Sludge Treatment / Processing

Trenching  Geobag *  Sludge Lagoon

Note *: Utilisation of Geo-bag method is presently under trial basis at certain areas.
Fecal Sludge Treatment / Processing

Centralised Sludge Treatment Facility

Belt Press

Centrifuge Decanter

MECHANISED

Filter Press

Mobile Dewatering
Dedicated sludge treatment facilities with Department of Environment approval nationwide

**IWK CURRENT SLUDGE FACILITIES**

- Trenching System Completed: 25 Nos
- Drying Beds Completed: 3 Nos
- Sludge Lagoon System Completed: 1 Nos
- Sludge Reception Facility Completed: 6 Nos
- Mechanised Dewatering Unit Completed: 23 Nos
- Dedicated Centralised Sludge Treatment Completed: 8 Nos

**Filter Press**
- 83 units

**Belt Press**
- 58 units

**Centrifuge**
- 19 units

**Completed Sludge Facilities**

- Centralised Sludge Treatment Facilities: 8 Nos
- Drying Beds: 3 Nos
- Sludge Reception Facility: 6 Nos
- Sludge Lagoon System: 1 Nos
- Drying Beds: 3 Nos
- Trenching System: 25 Nos

**Map of Trenching Sites**

- Gunung Raya, Langkawi (Closed)
- Assam Kumbang, Taiping (Closed)
- Sg. Siput, Kuala Kangsar
- Pedas, Rembau
- Pengkalan Hulu, Perak
- Private Nursery, Muar (Closed)
- Tentenga, Terengganu
- Ladang Jaya, Kota Tinggi (Closed)
- Glami Lemi, Jelebu
- Mukim Kupang, Baling
- Jeram Mengkuang, Bidor
- Pekan, Pahang
- Golden Teak, Batu Pahat (Closed)
- Juaseh, K. Pilah
- Papan, Perak (Temporary stopped)
- Tanjung Rhu, Penang
- Setiu, Terengganu
- Slim River
- Tanggol, Hulu Terengganu
- Kumpal, Dungun
- Gali, Raub
- Merlimau, Jasin
- Jemaluang, Mersing
- Slim River
- Labis, Segamat
- Labis, Segamat
- Trenching site at Setiu
- Trenching site at Kumpal, Dungun
- Trenching site at Bentong, Pahang
- Trenching site at Gali, Raub
- Trenching site at Pekan, Pahang
- Trenching site at Jemaluang, Mersing
Trenching System
Sludge Drying Beds – Drying Process
Sludge Drying Beds
With Roofing
Sludge Drying Beds – Filter Media
Typical Geobag Features

GEODYKE IN ISOMETRIC VIEW
NOT TO SCALE

200mmØ inlet tube
(See Detail B)

Width=3.3m after filling
Approximately 14.8m (after end seaming)

Webbing

Pump Inlet 200mmØ x 1000m L
Fastening straps of flight duty webbing L=1.5m

DETAIL B
NOT TO SCALE

DETAL C
NOT TO SCALE

NOTES
1) All dimensions are in meters unless otherwise stated.
2) Conceptual design only, not for construction.
Typical Geobag

GEODYKE IN ELEVATION VIEW
NOT TO SCALE

SECTION A-A
NOT TO SCALE

DRY BED WITH DEWATERING TUBE - 4 NOS/BED.
NOT TO SCALE

NOTES
1) All dimensions are in meters unless otherwise stated.
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Geobag Conceptual Design Proposal using Geobag System for Boost Water Treatment Plant, Sg. Petani, Kedah.
Geobag in Operation

Day 1 –
Commencement

Day 14 at 8.30 am
Height = 0.5 meter
Condition = Half Dry

Day 9 at 8.30 am
Height = 0.6 meter
Condition = Wet

Day 8 at 8.30 am
Height = 0.6 meter
Condition = Wet

Day 7 at 6.00 pm
Height = 0.75 meter
Condition = Wet
Semi Mechanical AVC System
MDU Operation Sequence

1. Initial setup
2. Equipment installation
3. Operation initiation
4. Process monitoring
5. Product storage
Centralized Sludge Treatment Facility
Fecal Sludge Management

Over the 16 years, fecal sludge handling and management in Malaysia has progressively improved to include sludge management strategies, acquiring dedicated and controlled sludge disposal sites and continuous research and development program for sludge reuse.
Sludge Disposal/Reuse

Sludge Disposal
- Landfill
- Incineration

Sludge Reuse
- Agriculture/Landscaping
- Compost/Co-compost
- Brick, Tiles
- Power Generation
- Reforestation
Ultimate Sludge Disposal/Reuse Strategies

- Soil Improvement
- Land Reclamation
- Composting
- Construction Material
- Fertilizer
- Landfill
Exploration of Green Technology

**Sewage Treatment Plant**

**Biosolids**
- Calorific Value: < 3,500 kcal/kg
- N < 3%; P < 1%; K < 0.1%
- Organic Matter < 50%

1. Proposed biosolids gasification to generate electricity
2. Biosolids composting to produce fertilizer
3. Biosolids enhancement to produce soil conditioner
4. Biosolids application for rubber plantation

**Biogas**
- Methane: 65 - 70%
- COD: < 25%
- N₂: < 5%

**Flare**
- Use of biogas for electricity generation at
  - Jelutong STP, Penang
  - Pantai STP, KL
  - Bunus STP, KL

**Fertilizer/Energy Value**
Challenges in Fecal Sludge Management

- Suitable Site
- Public Resistance
- Environmental Concern
- Suitable Technology
- Capital Cost
- Resources

Challenges
THANK YOU

TERIMA KASIH

For more info and queries please visit our website:

www.iwk.com.my