

# Indah Water Training Centre “INTERNATIONAL TRAINING”



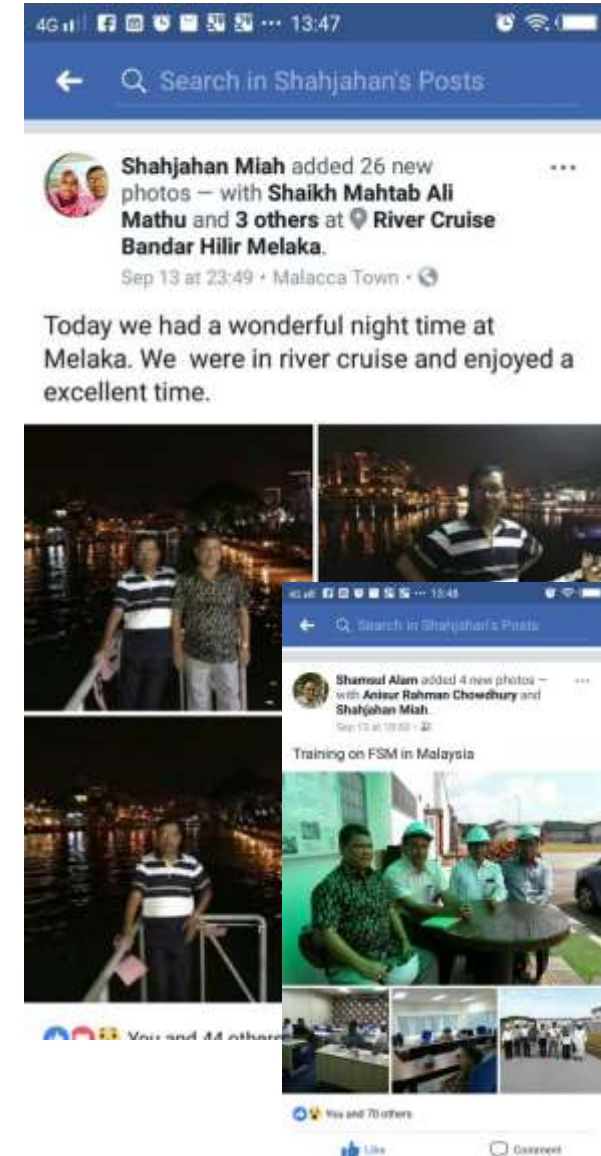
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# Why Malaysia

- Tropical climates with summer all year round
- Singapore and Japan might be too advanced and focused on a centralized and standard sewage treatment plants (STP)
- Indah Water operates on variety of actual STPs and Sludge Treatment Facilities (from non-mechanical systems running from the 70's & 80's) to most advance technology (Pantai 2 STP is the biggest centralized & underground STP facility in Asia Pacific)
- Customization of training to suit needs to help become a mentor and model for your team.
- We also work with relevant government bodies regulating dams, lakes, river and sea.
- Can customize to include sight seeing : visit UNESCO Historical city of Melaka or a trip to the tallest KLCC Petronas twin towers in the world.

# Customization For Programme

- Site visit to STPs or Fecal Sludge Plants various sites with different technology and sizes
- Demo desludging, Small Mechanical Dewatering Unit (co-treatment), geobag, for Fecal Sludge Management (FSM) training.
- Meeting regulators (National Water Commission -SPAN, Department of Irrigation and Drainage - DID, Local Municipality
- Meeting with Implementer or Operator: Alam Flora for Municipal Solid Waste
- Site visit interceptor sewer site, river projects, Solid waste landfill sites, wetland sites.



# HOW IWK BEGIN:



## Background

Sewerage system before independent; is managed by “**Sanitary Board**”. After independent sewerage is managed by Local Authority/ Municipality and City Council in city area and MOH in rural area.



## IWK Operation

IWK starts its operation with taking over of sewerage operation from **Dewan Bandaraya Kuala Lumpur (DBKL)** on **2 April 1994** as a private company.



## WSIA 2006 & SPAN

On **Jun 2006**, Water Services Industry Act 2006 (WSIA) & SPAN approved by the Parliament. **Akta 654 & 655**.



## Current Status

Until March 2017, **87** out of **144 LA** as mentioned in the concession IWK has handed its sewerage operation to IWK.

1990

1994

2006

2017

1993

2000

2007 / 2008

## Concession Agreement

On **8 December 1993**, Sewerage Services Act (**Act 508**) was approved. On **9 December 1993** IWK signed Concession Agreement with the Government of Malaysia to takeover, refurbish, upgrade, operate and manage, and maintain public sewerage system throughout the country.



## Government Takeover

IWK was taken over by the Government and its company became fully owned by **MKD** on **June 2000**.



## Enforcement

On **Feb 2007**, Establishment of the National Water Services Commission or *Suruhanjaya Perkhidmatan Air Negara (SPAN)* & **Jan 2008** full enforcement of Water Services Industry Act 2006 (**WSIA**).





# CURRENT STATUS: IWK

## Equity Ownership



2000-Current,

Indah Water Konsortium Sdn Bhd is a **National Sewerage Company** in Malaysia. IWK is wholly government-owned by **Minister of Finance Incorporated**



## Capacity

As of  
Dec 2019



**6,918** Sewage Treatment Plants (STP)



**1,228** Network Pump Stations (NPS)



**19,663 km** Length Pipelines



**3,482** Communal Septic Tanks



**1.34 Mil** individual Septic Tanks  
(excluding *pour flush*)

## Services



**10 State & 3 Federal Territories**



**26.2 Mil** Population Equivalent  
Connected (*CPE*) throughout Malaysia



**90** Local Authority (LAs)



**3,852,490** Billable Customers

## Strength



**3,338** Staff



**21** Operation Unit  
Office



**5** Laboratories



**59** Reporting Centre



**1** R&D Centre



**615** Maintenance  
Vehicles



**1** Training Centre



# IWK Nationwide Statistics

Type of System	Nos	PE Served	Sewerline (km)		Percentage (%)	
			Gravity	Forcemain	Gravity	Forcemain
STP	6,918	18,774,609	19,128.00	456.70	97.3%	2.3%
NPS	1,217	7,303,231				
VS	11	88,194	78.35		0.4%	
Grand Total	8,146	26,166,034	19,663		100%	



*\*\* Data as of Dec 19*

# International Training Programmes:

- Each programme is customized and designed to meet our client's objectives and requirements.
- We have 8 main programmes:
  - Fecal Sludge Management
  - Sewerage Journey in Malaysia
  - Non-Mechanical Sewerage Management
  - Fleet Management
  - Urban Centralized Treatment Plants
  - Effective Management of Effluent and Wastewater Treatment
  - River Management
  - Safety and Health Management
- Total participants since 2005 is 405
- See [www.iwk.com.my](http://www.iwk.com.my) for further details



Continent and Groups	Countries
Asia	14
Africa	3
Middle East	4
Pacific	2

# SEWERAGE JOURNEY IN MALAYSIA

Indah Water Konsortium (IWK) is a national sewerage company in Malaysia. IWK has been entrusted with the task of developing and maintaining a modern and efficient sewerage system for West Malaysia. In 1994, the Federal Government awarded the company the concession for nationwide sewerage services which prior to that, was under the responsibility of local authorities. Since then, IWK has taken over the sewerage services from local authorities in all areas except the States of Kelantan, Sabah, Sarawak and the Majlis Perbandaran Johor Bahru.

A modern and efficient sewerage system is vital for the country so as to ensure that wastewater is treated before being discharged into our rivers. This will help preserve the country's waste resources, protect public health and provide a cleaner and safer environment. In 2000, the Minister of Finance Incorporated, took over the entire equity in IWK from its previous private owners. IWK is now well-positioned to undertake the vital task of ensuring that Malaysians today and in the future will be able to enjoy a clean and healthy environment through a proper and well-maintained sewerage system.



## URBAN CENTRALIZED TREATMENT PLANTS

MORE than 500 sewage treatment plants (STP) in the Klang Valley will be decommissioned as part of Indah Water Konsortium Sdn Bhd's (IWK) effort in rationalising its efficiency from 2016. Out of this, 80 STPs will be upgraded to centralised plants to cater for the growing population in the Klang Valley. 521 STPs would be closed and the sewage from these plants will be rechanneled to bigger-capacity regional STPs. Some of the treatment plants were built back in the 1950s thus are unable to support the growing development in Klang Valley. Join us on an exploration of these amazing treatment plants that help not only the people but the environment.

The country's first underground sewage treatment plant is the construction of the Pantai 2 Sewage Treatment Plant (P2STP), which is equipped with state-of-the-art green technology. It is the biggest STP in Asia Pacific. This plant could cater to the growing population until 2035. The plant is able to receive the sewage flow from a

6,700ha Pantai catchment covering central and south-western parts of Kuala Lumpur including Bandar Baru Sentul, the proposed Sentul Raya Development, Central Business District, Bukit Kiara, the Botanical Gardens and a portion of Petaling Jaya. One of the main highlights of the project is the planned above-ground public facilities, which includes a community hall, jogging track and sports courts for tennis, basketball, futsal and football. The P2STP also features various green technologies including utilising the skylight concept for the underground plant, effluent reuse, rainwater harvesting and the use of biogas and solar panels to generate electricity. The plant also uses energy-efficient equipment to reduce the amount of electricity consumed.





# FECAL SLUDGE MANAGEMENT (FSM)

Fecal Sludge Management (FSM), is a management process that safely collects, transports, and treats septate from pit latrines, septic tanks or other onsite sanitation facilities. In other words, it deals with the mixture of human excreta and water that is collected in certain types of decentralized toilets and sanitation systems, instead of going into centralized Wastewater systems. In many developing countries, however, this service is often not provided at all or not done properly leading to surface water and groundwater pollution, spreading of pathogens into the environment, adverse health impacts and relatively high costs to households.

In Malaysia, FSM is particularly important in rural areas or old slightly densely populated areas where the population is not connected to sewerage network. Before 1994, the FSM was generally carried out as a service by the local authorities and then after 1994, Indah Water Konsortium (IWK) managed this services upon privatisation of the sewerage services from local authorities. Since then, IWK has provided this services for over 80 local authorities' area in the country. IWK has evolved in providing these services with proper procedures, specifications and management systems, and this services is also being accredited under the ISO14001 (Environmental Management System) since 2013.



## NON MECHANICAL SEWERAGE

A global estimate by the United Nations Development Programme and United Nations-Habitat is that 90% of all wastewater generated is released into the environment untreated. In many developing countries the bulk of domestic and industrial wastewater is discharged without any treatment or after primary treatment only.

Would you be shocked at some countries that discharges raw sludge into the environment? What if untreated sewage is injected to the city's groundwater? Should we rely on septic tanks?

Discover how Malaysia has utilized from non-mechanized to one of South East Asia's biggest sewage treatment plants. These economically conscious technology has help drive the need for people and environment protection and in Malaysia we are fortunate to explore a variety of treatment processes using different technologies. Indeed a showcase to marvel at the breath of what is needed to manage sanitation.



# RIVER

Faecal Sludge Management has an important impact on any river in the world. Malaysia has her history of managing river programmes and we would like to share our journey with you. This program explore the evolution of managing policies, designs, legal effectiveness and implementation of a case study.

Today, Malaysia has a successful case study in managing the Melaka River. The river has been the centre of activity throughout its history in economics, people, industrialization and growth. All of these have shaped the future of important source of water to Malaysia. It has seen its share of indiscriminate dumping of waste, nutrient pollution and raw sewage contamination. Melaka is a historic city blessed with a beautiful river as a

major trading centre with its influence of Malay, Arab, Indian, Chinese, Portuguese, Dutch and British heritage. In 2008 it was listed as a UNESCO World Heritage Site and a favourite destination for many tourists visiting Malaysia.

Examples of projects carried out by Department of Irrigation:

- Storm water treatment plant and interceptor drains,
- Excavation, cleaning the river and installation of gross pollutant traps
- River bank protection, river walks, river information centre and pedestrian bridges



# FLEET

A vacuum truck or vacuum tanker is used for desludging liquid sludge from septic tanks, pit latrine and pour flush. These tankers are the heart and the beginning of mechanised process of faecal sludge management (FSM) process. These faecal sludge tankers are important features that must be strategically planned. Failure to maintain and plan for these desludging tankers may jeopardize the operation of faecal sludge operations and overall FSM business. .

Indah Water has over 150 numbers of these tankers nationwide and has evolved over 23 years of experience in handling fleet of faecal sludge tankers as part of faecal sludge management. Learn about Indah Water faecal sludge tankers operations, specific features, safety features, fleet operational and maintenance requirement and best practices of our desludging tankers and fleet management.



# COSTING (EXAMPLE)

5 days training for 10 pax at approximately **USD 1200 per person** (Note: additional USD500 per person for a 5 days accommodation)

Study Visit fee includes:

- Airport pick-up to hotel and return
- Transportation to training sites, site visits and return to hotel
- Site visit and facility demonstration fee
- Food and Beverage during training days
- Training and Consulting fee
- Modules Development fee
- Trainers' fee
- Administration fee
- 6% Malaysian Sales and Services Tax (SST)

## FACILITIES (TRAINING CENTRE)

- Lunch with 2 coffee breaks
- Monday to Friday
- 10m walk to Light Rail Transit (LRT) Bukit Jalil Station
- Visits to Asia Pacific biggest underground STP
- 6 rooms
- 157 person occupancy
- Material production
- Audio & Visual equipment
- Free Parking
- Free WiFi
- Onsite Treatment Plant KLR340
- Mock Up facilities including tankers and IST
- Exploration visits for Rivers and Wetlands



# SAMPLE PROGRAMME SCHEDULE



INTERNATIONAL EXPOSURE VISIT GOVERNMENT OFFICIALS  
FECAL SLUDGE & SOLID WASTE MANAGEMENT  
Indah Water Konsortium Sdn. Bhd., Malaysia

<b>Day 0 (Sunday, 22 Oct 2017)</b>		
Arrival at KLIA and airport pick-up of Delegates to Hotel		
Arrival of Delegates to Hotel		
6.00	7.00	Arrival at KLIA and airport pick-up of Delegates to Hotel
8.00	13.00	Arrival and freshen up/ rest (own program)
<b>Day 1 (Monday, 23 Oct 2017)</b>		
8.00	9.00	Delegates arrive at IWTC
9.00	9.30	Introduction & Presentation by Kazakhstan Delegates on challenges faced and expectations.
9.30	10.30	Introduction of Malaysian Sanitation & Sewerage Journey <i>Ir. Dorai Narayana</i>
10.30	11.30	Overview of IWK Operations & systems: COEDS, AMIS, Risks System, Operation System <i>Suriya Narhayhanen, HOO Gombak Unit., Operations</i>
11.30	11.50	Tea break (IWTC to arrange)
11.50	12.50	Overview of Sewerage Regulatory Requirements <i>Punita NN, Water Services Commission (SPAN)</i>
12.30	13.30	Lunch (IWTC to arrange)
13.30	14.30	Travel to Alam Flora Transfer Station (Solid Waste Transfer Station)
14.30	15.30	Briefing by Alam Flora
15.30	16.00	Tea break
16.00	17.00	Site Visit to Alam Flora Transfer Station
17.00	18.00	Return to Hotel

<b>Day 2 (Tuesday, 24 Oct 2017) - Overview of IWK</b>		
8.45	9.30	Travel to Taman Mawar SBR CSTP
9.30	10.30	• Taman Mawar SBR Unit Office, Sludge Reception & Sludge Treatment Briefing <i>Tmn Mawar CSTP, Syed Anuar, Exec, Tmn Mawar CSTP.</i>
10.30	12.00	Taman Mawar CSTP Site Visit • Q&A
12.00	12.30	Travel for Lunch
12.30	13.30	Lunch (IWTC to arrange)
13.30	14.30	Delegates arrive at Bukit Tagar or Jeram Sanitary Landfill
14.30	15.30	• Briefing by Landfill Operator
15.30	15.45	• Site Visit to Landfill and Treatment Plant
16.30	17.30	• Return to Hotel
<b>Day 3 (Wednesday, 25 Oct 2017) - Field Visit to Sg Udang CSF, geobag and MDU Melaka</b>		
8.00	10.00	Travel to Melaka MITC
10.00	10.15	Tea / Coffee Break (Unit to arrange)
10.15	11.30	Site Visit IST desludging demo
11.30	12.30	Site Visit (MDU, geobag & Sludge Drying Bed)
12.30	13.30	• Desludging Services & Sludge Collection and Transportation <i>Ms Tay Yizhen, Exec, DSU</i>
13.30	14.30	Lunch (Unit to arrange)
14.30	15.00	Travel to Sg Udang CSF (Sludge Facility)
15.00	15.15	• Brief Overview of Melaka UO /Sg Udang CSTF <i>Mr Suradi Nata, Exec Operation, O&amp;M Department</i>
		Site Visit to Sg Udang CSTF
15.15	15.30	Tea / Coffee Break (Unit to arrange)
15.30	17.00	Site Visit Sg Udang CSF
17.00	19.00	Return to KL
<b>Day 4 (Thursday, 26 Oct 2017) - Depart for Kazakhstan</b>		
8.30	14.30	Delegates own program
14.30	15.30	Travel to KLIA/Departure



# Sewerage Journey Case Studies: Malaysia & India

## Malaysia Sewerage Journey

- Limited budget for sanitation or cost issue
- Limited disposal area
- Land scarcity for sewerage in city area
- No power supply in remote area
- Lack of public awareness on need to carry out desludging
- No treatment plant nearby in remote area
- Logistic issue, travel distance, time constraint
- Plant available but not able to accept additional load from fecal sludge
- Too many small treatment plants
- Not enough tankers & manpower
- Lack of demand in reuse of sludge
- Lack of policy and guideline on sludge reuse
- High water table and high rain density/flash flood
- Desludging operate at designated area.
- Open competition and regulated pricing
- No disposal area for private contractor
- Dried sludge not sell as resource or reuse

## India Sewerage Journey

- High population density
- Water scarcity
- Open defecation & no septic tanks or toilet
- No regulation and enforcement on FSM
- Limited budget for sanitation or cost issue
- Lack of awareness on FSM
- Lack of public awareness on need to carry out desludging
- Not enough tankers & manpower
- Not enough skilled workers
- Plant available but not able to accept additional load from fecal sludge
- Land scarcity for sewerage in city area
- No treatment plant nearby in remote area
- Limited no of treatment plants
- No power supply in remote area
- Desludging no operation boundary
- Open pricing and competition
- No proper disposal area

# Sewerage Journey Case Studies: Bangladesh & Vietnam

## Bangladesh Sewerage Journey

- High population density
- Limited budget for sanitation or cost issue
- Limited disposal area
- Land scarcity for sewerage in city area
- Fluctuation of power supply
- Lack of public awareness on need to carry out desludging
- Treatment plant only in Dhaka and not many in remote area
- Lack of knowledge on fecal sludge management
- Limited centralised sewage and fecal sludge plant
- Too many individual septic tank (ISTs) and limited resource
- No tariff for water and sanitation, billed in the monthly tax
- Not enough tankers & manpower
- Lack of policy and guideline on sanitation and fecal sludge
- High water table and high rain density or flash flood
- Desludging operate still new.
- Able to eradicate open defecation and install toilets
- No disposal area and lack of knowledge on fecal sludge management

## Vietnam Sewerage Journey

- High population density especially in city area
- Combine sewer in Hanoi City Area to protect the river water quality
- Difficulty in providing sewer lines separately due to development congestion
- No regulation and enforcement on FSM
- Limited budget for sanitation or cost issue
- Lack of awareness on FSM
- Lack of public awareness on need to carry out desludging
- Focus on combine sewer with advance technology, conventional activated sludge (CAS) in City area
- Plant available but not able to accept additional load from fecal sludge
- Land scarcity for sewerage in city area
- Not many treatment plant nearby in remote area
- No policy and guidelines in FSM

# Sewerage Journey Case Studies: Senegal & Zambia

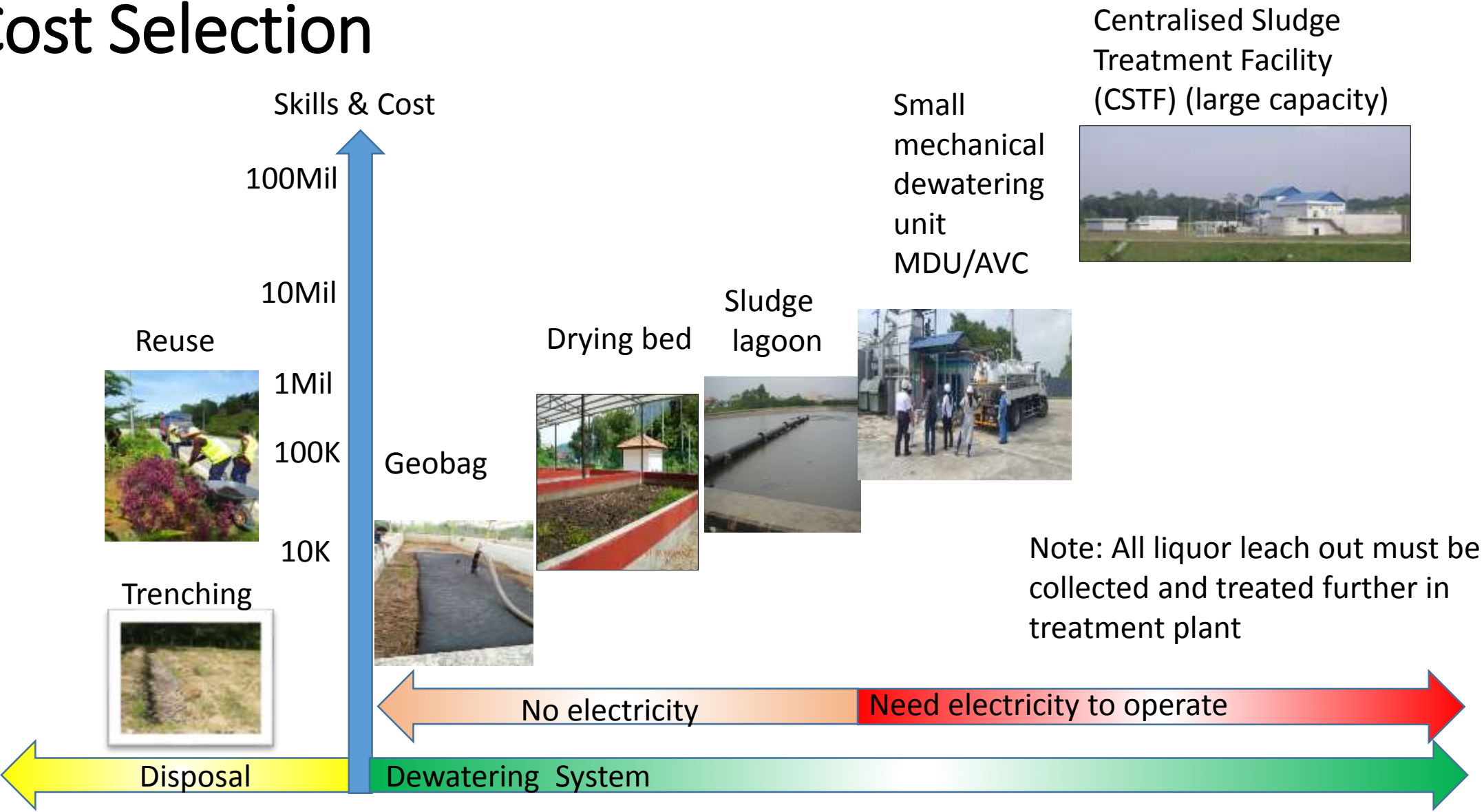
## Senegal Sewerage Journey

- High population density
- Limited budget for sanitation or cost issue
- Land scarcity for sewerage in city area
- Fluctuation of power supply
- Lack of public awareness on need to carry out desludging
- Treatment plant only in Dakar and not many in remote area
- Lack of knowledge on fecal sludge management
- Too many ISTs and limited resource
- No tariff for water and sanitation, billed in the monthly tax
- Not enough tankers & manpower
- Lack of fleet desludging tankers technology and maintenance of fleet
- Fleet of tankers are growing old
- Has advance and compact sludge facility Omni-processor from Bill & Melinda Gates Foundation
- Strong public private partnership—tankers partnership for desludging activities
- High demand of dried sludge or reuse

## Zambia Sewerage Journey

- High population density especially in city area
- Has strong water supply and sanitation council and regulatory function
- Easy to regulate the tariff structure since no political discretion
- Need more knowledge on asset management
- Limited budget for sanitation or cost issue
- 30% sewer and more than 40% ISTs, among the highest in Sub-Sahara region
- Combine water supply and sanitation management under council power
- Lack of public awareness on need to carry out desludging
- Has Licensed operator and guidelines of water and sanitation
- Water scarcity and poor sanitation in rural area
- Received aid from various developed countries on water and sanitation
- Not many treatment plant nearby in remote area
- Advance in regulatory and tariff setting of sanitation
- High demand of dried sludge or reuse

# Cost Selection





# Technology Advise

## **Option A Sludge disposal**

- Trenching site for sludge disposal in remote area and low water table area
- Reuse of sludge

## **Option B: Dewatering**

### **Option 1 No power supply & Minimum cost**

- Geobag + Water proof lining + collection chamber + tankered collected liquor to underloading STP

### **Option 2 No power supply & Average cost**

- Drying bed + collection chamber + tankered collected liquor to underloading STP

### **Option 3 No power supply & Average cost**

- Geobag + water proof lining collected into Existing underloading non-mechanical plant

## **Option 4 Medium cost & power supply**

- Drying bed + piping collection chamber into Existing underloading mechanical plant

## **Option 5 Power supply & High cost and skilled**

- Small mechanical dewatering + existing underloading plant

## **Option 6 Power supply & Highest cost and skilled workers**

- Centralised Sludge Treatment Facilities

- **Note:** All Options need Engineer advise to check possibility of mixing liquor leaching from sludge into existing under loading plant
- Option 1 lowest skill and cost
- Option 6 the highest cost and skilled

# T2T TRAINING FRAMEWORK (FSM)

SECTOR	WATER SERVICES																				
SUB SECTOR	ACCREDITATION	WATER SUPPLY								SEWERAGE						NON-MECHANICAL		MECHANICAL			
JOB AREA	Education Background	Water Resources	DAM Safety Management	WATER TREATMENT			WATER DISTRIBUTION			PLANNING AND DESIGN			OPERATION AND MAINTENANCE								
COST SELECTION				Maintenance	Operation	Laboratory	Instrumentation	Operation	Non-Revenue Water	Treatment	Network	Desludging	Treatment	Network	Desludging						
	PhD									HEAD OF DEPARTMENT (with option of Ir.)											
RM > 100Mil CSTF	Master's									HEAD OF SECTION (with option of Ir.)										<ul style="list-style-type: none"><li>Basic Microbiology of Sewage Treatment Plant</li><li>Operation and maintenance of sludge treatment facility</li><li>Certified Environmental Professional in Sewage Treatment Plant Operation (CePSTPO)</li></ul>	
RM > 1Mil AVC MDU	Bachelor's									SENIOR MANAGER											
RM < 500K Sludge Lagoon	Advance Diploma	Water Resources Manager	Dam Manager	Water Treatment Plant Manager			Water Distribution Manager		Water Distribution Manager	Planning and Design Manager		Treatment Manager	Network Manager	Desludging Manager	<ul style="list-style-type: none"><li>Operation and maintenance of sludge treatment facility</li><li>Sewage sampling techniques and records</li><li>Operation and Maintenance of oxidation pond and aerated lagoon</li></ul>						
RM < 100K Drying Bed	Diploma	Water Resources Executive	Dam Executive	Facility Executive	Water Treatment Plant Executive	Chemist	Water Distribution Instrumentation Executive	Water Distribution Executive	NRW Executive	Planning and Design Engineer		Treatment Engineer	Network Engineer	Desludging Executive	<ul style="list-style-type: none"><li>Operation and maintenance of sludge treatment facility</li><li>Sludge Dewatering and disposal</li><li>Sewage sampling techniques and records</li></ul>						
RM < 10K Geobag Trenching Latrin pit	Certification	Water Resources Senior Technician	Dam Supervisor	Facility Senior Technician	Water Treatment Plant Senior Technician	Quality Assurance Senior Technician	Water Distribution Instrumentation Senior Technician	Water Distribution Operation Senior Technician	NRW Sr. Technician			Treatment Supervisor	Network Supervisor	Desludging Supervisor	<ul style="list-style-type: none"><li>Occupational Safety and Health at Workplace</li><li>Defensive Driving</li><li>Desludging Works and know your tanker</li><li>Sewage sampling techniques and records</li></ul>						
		Water Resources Technician	Dam Technician	Facility Technician	Water Treatment Plant Technician	Lab Assistant Technician	Water Distribution Instrumentation Technician	Water Distribution Technician	NRW Technician			Treatment Technician	Network Technician	Desludging Surveyor	<ul style="list-style-type: none"><li>Safety Passport</li><li>Basic Septic Tank Design</li><li>Preliminary &amp; Primary Treatment</li></ul>						
			Dam Operator	Handyman		Water Sampler		Fitter	NRW Field Assistant (Crew)					Desludging Operator							

# Technology Selection: Non-Mechanical

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## Trenching

Disposal site and No Power Supply

- Used in remote area where there is no STP nearby.
- No power supply needed and cheap and easy installation
- Easy to used, simple disposal of dried sludge in a trenches
- Proper selection of site must be considered (away from public and low water table)
- Proper monitoring of ground water borehole is needed

## Geobag

No STP and No Power Supply

- No STP and No Power Supply
- Used in remote area where there is no STP nearby.
- No power supply needed and cheap and easy installation
- Easy to used, simple handling placement of geobag on concrete floor or water proof area
- Need proper collection of liquor leach out from the bag and sent to the plant

## Drying bed

No STP and No Power Supply

- Used in remote area where there is no STP nearby.
- No power supply needed and medium cost to design and built
- Easy to used, simple handling
- Need proper collection of liquor leach out from the drying bed and the liquor collected in a tank to be regularly sent by tanker to the a proper underloading STP.

# List of Trainings Needed: Non-Mechanical

- **Planning:**

- Planning of Sewerage System
- HAZOP Studies

- **Design:**

- Basic Septic Tank Design
- Preliminary & Primary Treatment

- **General Course:**

- Safety Passport Programme
- Occupational Safety & Health Hazard at Workplace
- Refresher on Occupational safety & Health
- Defensive Driving
- Health & Safety Induction for Construction Workers
- Construction of Sewerage Treatment Plants

- **Operation:**

- Desludging work and know your tanker
- Operation and maintenance of sludge reception facility
- Operation and maintenance of oxidation pond and aerated lagoon
- Sludge dewatering and disposal
- Sewage sampling techniques and records



# Technology Selection : Non-Mechanical and Mechanical

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## Non mechanical STP

Small STP with No Power Supply

- Small or large STP no power supply and from non-mechanical treatment plant
- Oxidation pond require big land size
- Need slightly high capital expenditure (CAPEX) and low operation expenditure (OPEX)
- Underloading STP may be considered for accepting incoming liquor leached out from geobag.
- Small value of underloading capacity not recommended. Engineer or designer to calculate the possibility of acceptance of this liquor.
- Geobag does not require highly skill operator, however operation of treatment plant need proper training



- **Oxidation Pond** is a centralize sewage treatment plant.
- Oxidation ponds, also called lagoons or stabilization ponds, are large, shallow ponds designed to treat wastewater through the interaction of sunlight, bacteria, and algae.
- Oxidation Ponds (or Stabilization Ponds) are a popular sewage treatment method in the 70s and 80s for small communities because of their low construction and operating costs. It was build more than 2 decades ago and IWK still has over 200 of this system in Malaysia
- Electricity : Nil

# Technology Selection : Non-Mechanical and Mechanical

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## Geobag

Small STP with Regular Power Supply and Drying Bed

- Small or large STP with drying bed and has excess capacity or underloading can be consider to use geobag to reduce risk of smell especially if near residential area
- Underloading STP may be considered for accepting incoming liquor leached out from geobag.
- Need high CAPEX and OPEX
- Small value of underloading capacity not recommended. Engineer/designer to calculate the possibility of acceptance of this liquor.
- Geobag does not require highly skill operator, however operation of treatment plant need proper training



- **Geotube** on drying bed
- Treatment Capacity 1,000 PE (11 m<sup>3</sup> x or 0.225MLD) 20 x 4.5m<sup>3</sup> tankered sludge, 2 months to fully dry
- Natural Gravity Filtration System, and liquor coming out of geobag need to be treated further in treatment plant
- Electricity : Nil

# Technology Selection : Non-Mechanical and Mechanical

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## Drying Bed

Small STP and Regular Power Supply

- Small or large treatment plant with drying bed, if underloading treatment plant may be possible to accept fecal sludge
- A proper sewage treatment plant need high CAPEX and OPEX
- Cost running drying bed to dry sludge lower than mechanical dewatering
- Sludge drying bed take bigger space and longer time frame to dry sludge than mechanical drying equipment
- Liquor seep underneath drying bed drain and treated further into a treatment plant
- Operating sludge drying bed run by batch and does not required highly skilled operator
- Skill operator is needed to operate the CSTP

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- **Jasin Sludge Drying Bed** & co-treatment of liquor from fecal sludge at under loading Centralised Sewage Treatment Plant from industry area
- Capacity of STP 1,000 PE (225m<sup>3</sup>/d or 0.225MLD)
- Treatment type : Extended Aeration System with co-treatment of tankered sludge
- Sludge for this plant is dried using drying bed

# List of Trainings Needed: Non-Mechanical and Mechanical

- **Planning:**

- Planning of Sewerage System
- Plant Integration and Planning
- HAZOP for sewerage systems

- **Design:**

- Sewer Design
- Basic Septic Tank Design
- Preliminary & Primary Treatment

- **General:**

- Safety Passport Programme
- Occupational Safety & Health Hazard at Workplace
- Defensive Driving
- Health & Safety Induction for Construction Workers
- Construction of Sewers
- Construction of Sewerage Treatment Plants

- **Operation:**

- Desludging work and know your tanker
- Operation and maintenance of sludge reception facility
- Operation and maintenance of oxidation pond and aerated lagoon
- Certified Environmental professional in Sewage Treatment Plant Operation (CePSTPO)
- Introduction to Treatment Plant Operations
- Treatment Plant Operators Refresher Course
- Introduction to Operation & Maintenance of Sewerage Systems
- NIOSH Authorised Entry and Standby–Person
- Basic Microbiology of Sewage Treatment Plant
- Sludge thickening and stabilisation
- Sludge dewatering and disposal
- Sewage sampling techniques and records



# Technology Selection: Mechanical

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## Mechanical dewatering

Has STP and Regular Power Supply and small capacity

- Small STP possible to accept additional co-treatment from fecal sludge depends on excess capacity available
- Used in area where there is proper under loading STP nearby with enough empty space
- Need power supply (by batch running the dewatering machine) and high cost to design and built, and steady power supply to run under-loading STP
- Proper training needed
- Need skilled workers, proper maintenance and budget needed
- Need proper collection of liquor leach out from the drying bed and the liquor collected in a tank to be regularly sent by tanker to the a proper STP



- **Jasin Mechanical Dewatering Unit** & co-treatment of liquor from fecal sludge at under loading Centralised Sewage Treatment Plant from industry area
- Capacity of STP 1,000 PE (225m<sup>3</sup>/d or 0.225MLD)
- Treatment type : Extended Aeration System with co-treatment of tankered sludge

# Technology Selection: Mechanical

## Mechanical dewatering

### Large Capacity STP and Regular Power Supply

- Used large area, large CAPEX and OPEX.
- The sewage treatment plant must be properly design, build and operate
- Large STP possible to accept co-treatment from tankered sludge depends on excess capacity available
- Need power supply (by batch running the dewatering machine)
- High cost to design and built, and steady power supply to run underloading STP
- Proper training needed
- Need skilled workers, proper maintenance and budget needed



- **Pantai 1 Centralised Sewage Treatment Plant**
- Capacity :377,000 PE (84,825m<sup>3</sup>/d or 84.8MLD)
- Treatment type : Step Feed Nitrogen Removal Activated Sludge System with co-treatment of tankered sludge
- The plant is designed complete with fecal sludge reception facility and the liquor from dewatering machine is co-treated in large sewage treatment plant

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# Technology Selection: Mechanical

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## Centralised Sludge Treatment Facility

Has Large CSTF and Regular Power Supply

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- Used large area, large CAPEX and OPEX. Typically footprint of centralized sludge treatment facility (CSTF) is smaller than centralized sewage treatment plant (CSTP)
- The CSTF must be properly design, build and operate
- Need steady power supply (by batch running the dewatering machine)
- High cost to design and built
- Proper training needed
- Need skilled workers, proper operation, maintenance and budget needed
- Need proper disposal site or recycle of sludge if possible



- **Sungai Udang Centralised Sludge Treatment Facility (Sg Udang CSTF)**
- Capacity 300,000 PE (250m<sup>3</sup>/d)
- Has a proper tankered sludge reception area complete with pretreatment area. Liquor from dewatering machine will be treated in Extended Aeration Activated Sludge Plant
- Type of System: Extended Aeration Activated Sludge

# List of Trainings Needed: Mechanical

- **Planning:**

- Planning of Sewerage System
- Plant Integration and Planning
- HAZOP for sewerage systems

- **Design:**

- Sewer Design
- Basic Septic Tank Design
- Preliminary & Primary Treatment
- Design of Pump Station
- Activated Sludge System

- **General:**

- Malaysia Civil Engineers Standard Method of Measurement (MyCESMM)
- Malaysia Industrial Sewerage Guidelines
- Fecal Sludge Management
- Safety Passport Programme
- Occupational Safety & Health Hazard at Workplace
- Defensive Driving
- Health & Safety Induction for Construction Workers
- Construction of Sewers
- Construction of Sewerage Treatment Plants

- **Operations:**

- Desludging work and know your tanker
- Operation and maintenance of mechanical dewatering unit
- Operation and maintenance of sludge reception facility
- Certified Environmental professional in sewage treatment Plant Operation (CePSTPO)
- Introduction to Treatment Plant Operations
- Treatment Plant Operators Refresher Course
- Introduction to Operation & Maintenance of Sewerage Systems
- Malaysia Authorised Entrant and Standby Person to Confine Space (AESP)
- Malaysia Authorised Gas Tester for Confine Space (AGT)
- Basic Microbiology of Sewage Treatment Plant
- Operating Extended Aeration System
- Operating Sequencing Batch Reactor
- Aeration System for Activated Sludge
- Basic Microbiology of Sewage Treatment Plant
- On-site measurement and testing of process control
- Troubleshooting and process control for sewage treatment
- Sewage sampling techniques and records
- Sludge thickening and stabilisation
- Sludge dewatering and disposal



# Indah Water Training Centre (IWTC)

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