



TRENCHLESS ASIA 2026

THAILAND

STRATEGIC APPLICATION OF TRENCHLESS TECHNOLOGIES IN WATER AND WASTEWATER

DR. FAIZAL BIN OTHMAN

MALAYSIA ASSOCIATION FOR TRENCHLESS TECHNOLOGY



www.trenchlessasia.com

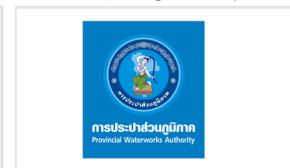
Organised by



Official Host Authority



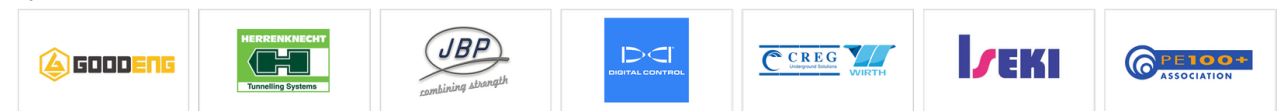
Official Supporting Authority



Supporting Authority



Sponsors



Supported by



Media Partner





TRENCHLESS ASIA 2026

THAILAND



MATT Knowledge Sharing

- *STRATEGIC APPLICATION OF TRENCHLESS TECHNOLOGIES IN WATER AND WASTEWATER*

Faizal Othman

PRESIDENT

Malaysia Association for Trenchless
Technologies (MATT)



Trenchless Technologies application in the Water and Sewerage Industry



Introduction

Trenchless technology also known as no-dig technology, refers to a range of techniques used to install, repair, or replace underground pipes without digging trenches.

In **pipeline installation**, trenchless technology can be used to install new pipelines without the need for extensive excavation work.

In **pipe rehabilitation**, trenchless technology can be used to repair or replace damaged sections of pipe without the need for excavation.

COMMON TRENCHLESS METHOD USED IN MALAYSIA

Method (typically used in Sewer in Malaysia)

Rehabilitation Repair	Resin Patch Repair
	Top Hat Lateral Seal
Rehabilitation Renovation Structural	CIPP (Cure in Place Pipe Lining)
	Spiral wound lining
Rehabilitation Replacement	Pipe Bursting
New Installation Trenchless	Pipe Jacking
	Micro tunnelling
	Horizontal Directional Drilling (HDD)

Trenchless Technologies Method

Conventional Method



Manual Excavation



Mechanized Excavation



Root Cutter



Resin Patch Repair



Robotic Cutter

Top Hat

Pipe Jacking



Horizontal Directional Drilling (HDD)



Cure in Place Pipe Lining (CIPP)



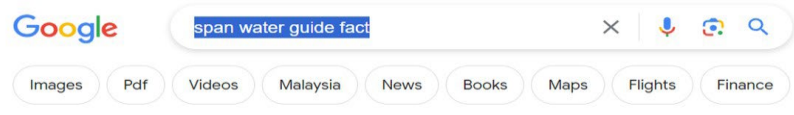
STRATEGIC APPLICATION OF TRENCHLESS TECHNOLOGIES IN WATER AND WASTEWATER



Snapshot statistics of water and sewerage sector in Malaysia



<https://www.span.gov.my/article/view/water-sewerage-fact-book-2022>



About 102,000,000 results (0.47 seconds)

SPN Suruhanjaya Perkhidmatan Air Negara
<https://www.span.gov.my> view

WATER & SEWERAGE FACT BOOK
WATER & SEWERAGE FACT BOOK. WATER & SEWERAGE FACT BOOK 2022 · WATER & SEWERAGE ... aduan@span.gov.my. 013 388 5000 (WhatsApp). Hubungi Kami. Hantar. Imb...

PENINSULAR MALAYSIA & F.T. LABUAN

Population	No. of Population: 26,789,700 Urban: 75.1% Rural: 24.9%	Economy	2021 GDP Growth: 3.1% Household Income: RM5,209 Household Expenses: RM4,534	Raw Water Extraction	Grand Total: 16,218 MLD River: 81.1% (13,146 MLD) Dam: 17.0% (2,765 MLD) Ground Water & Others: 1.9% (307 MLD)	
Water Supply	No of WTP: 344 Design Capacity (Demand): 18,561 MLD Water Demand(SIV): 15,653 MLD Reserve Margin: 15.7%	Non Revenue Water	Billed Authorised Consumption: 10,265 MLD NRW: 5,389 MLD NRW: 34.4%	Water Consumption	Grand Total: 10,089 MLD Domestic: 63.0% (6,357 MLD) Non Domestic: 37.0% (3,732 MLD)	
Population Served	State: 97.1% Urban: 97.1% Rural: 97.0%	Domestic Consumption Per Capita	DOMESTIC CONSUMPTION PER CAPITA 237 LCD		No. of Accounts	Grand Total: 7,990,635 Domestic: 86.6% (6,921,716) Non Domestic: 13.4% (1,068,919)
Pipeline (Kilometers)	135,975 Kilometers AC: 29.3% (39,895) MS: 27.2% (36,937) CI: 0.8% (1,028) DI: 6.6% (9,006) UPVC: 17.1% (23,240) OTHERS: 3.0% (4,127) PE: 16.0% (21,741)	Meters	No. of Meters: 7,919,937 0-7 Years: 79.8% (6,321,813) >7 Years: 20.2% (1,598,124)	Water Interruption	Scheduled: 1,935 Unscheduled: 43,956	
Complaints	No. of Complaints: 1,365,686 Pipe Breakage: 38.5% (525,567) Water Quality: 0.6% (8,200) Water Interruption: 17.1% (233,399) Water Pressure: 6.3% (86,653) Billing & Meter: 24.5% (334,887) Others: 13.0% (176,980)	Workforce (Water Operator)	No. of Staff: 15,964 Management: 723 Executive: 2,091 Non Executive: 11,629 Meter Reader: 1,521	Public Sewage Treatment	No. of STP: 7,503 PE: 31,417,704 Multipoint: 7,395 Regional: 108 No. of STP PE: 20,186,013 11,231,691	
Private Sewage Treatment	No. of STP: 4,641 PE: 4,957,337	Septic Tank	No. of Septic Tank: 1,370,746 PE: 7,666,086 Communal: 4,230 Individual: 1,366,516 PE: 514,344 7,151,742	Other Facilities	STP: Length of Sewer pipes: 21,615 Kilometers CST: Length of Sewer pipes: 349 Kilometers NPS: 1,454	
Traditional System	No. of Traditional System: 1,156,314 PE: 5,781,570	No. of Accounts	No. of Accounts: 4,667,335 Domestic: 87.3% (4,075,463) Commercial: 9.2% (428,132) Industrial: 0.2% (8,870) Government Permits: 0.1% (6,480) Government Quarters: 3.2% (148,390)	Complaints	No. of Complaints: 855,574 Billing: 84.5% (723,221) Desludging: 9.3% (79,932) Others: 0.7% (5,703) NPS: 4.7% (40,071) STP: 0.8% (6,647)	
Workforce (Sewerage Operator)	No. of Staff: 3,407 STP & Treatment: 1,377 Network: 293 Desludging: 392 Operating & Planning: 1,044 Others: 301	Last Revision (Water Rates)	Refer to page water rates by state		Last Revision (Sewerage Rates)	Refer to page sewerage rates by IKK

Strategic challenges

Water

NRW 35%

Old pipes AC > 40/50 yo

Pipe breakages and interruptions

Reserve margin 15% @ 2500MLD vs water lost via NRW 5400 MLD

Sewerage

High nos Multipoint STPs, private STPs, CST, IST

Private STPs and ISTs still ~ 30% of STPs

RSTP catchment half of Multipoint system

Pollution loading to rivers

Regional STP system to be expanded

- RSTPS planned and to be built in matured urban areas
- network system 22K vs 135k in water

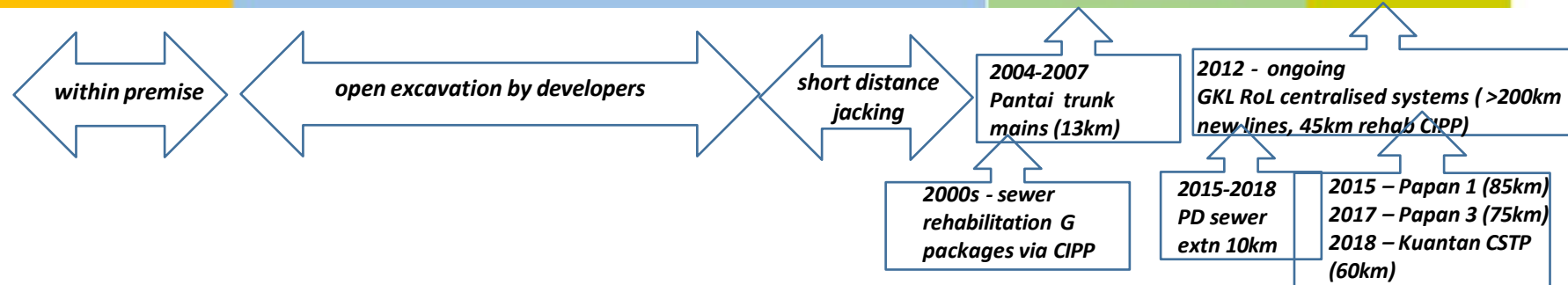
PENINSULAR MALAYSIA & F.T. LABUAN

Population	No. of Population: 26,789,700 Urban: 75.1% Rural: 24.9%	Economy	2021 GDP Growth: 3.1% Household Income: RM5,209 Household Expenses: RM4,534	Raw Water Extraction	Grand Total: 16,218 MLD River: 81.1% (13,146 MLD) Dam: 17.0% (2,765 MLD) Ground Water & Others: 1.9% (307 MLD)	
Water Supply	No of WTP: 344 Design Capacity (Demand): 18,561 MLD Water Demand(SIV): 15,653 MLD Reserve Margin: 15.7%	Non Revenue Water	Billed Authorised Consumption: 10,265 MLD NRW: 5,389 MLD NRW: 34.4%	Water Consumption	Grand Total: 10,089 MLD Domestic: 63.0% (6,357 MLD) Non Domestic: 37.0% (3,732 MLD)	
Population Served	State: 97.1% Urban: 97.1% Rural: 97.0%	Domestic Consumption Per Capita	DOMESTIC CONSUMPTION PER CAPITA 237 LCD		No. of Accounts	Grand Total: 7,990,635 Domestic: 86.6% (6,921,716) Non Domestic: 13.4% (1,068,919)
Pipeline (Kilometers)	135,975 Kilometers AC: 29.3% (39,895) MS: 27.2% (36,937) CI: 0.8% (1,028) DI: 6.6% (9,006) UPVC: 17.1% (23,240) OTHERS: 3.0% (4,127)	Meters	No. of Meters: 7,919,937 0-7 Years: 79.8% (6,321,813) >7 Years: 20.2% (1,598,124)	Water Interruption	Scheduled: 1,935 Unscheduled: 43,956	
Complaints	No. of Complaints: 1,365,686 Pipe Breakage: 38.5% (525,567) Water Quality: 0.6% (8,200) Water Interruption: 17.1% (233,399) Water Pressure: 6.3% (86,653) Billing & Meter: 24.5% (334,887) Others: 13.0% (176,980)	Workforce (Water Operator)	No. of Staff: 15,964 Management: 723 Executive: 2,091 Non Executive: 11,629 Meter Reader: 1,521	Public Sewage Treatment	No. of STP: 7,503 PE: 31,417,704 Multipoint: 7,395 Regional: 108 PE: 20,186,013 PE: 11,231,691	
Private Sewage Treatment	No. of STP: 4,641 PE: 4,957,337	Septic Tank	No. of Septic Tank: 1,370,746 PE: 7,666,086 Communal: 4,230 Individual: 1,366,516 PE: 514,344 PE: 7,151,742	Other Facilities	STP: Length of Sewer pipes: 21,615 Kilometers CST: Length of Sewer pipes: 349 Kilometers NPS: 1,454	
Traditional System	No. of Traditional System: 1,156,314 PE: 5,781,570	No. of Accounts	No. of Accounts: 4,667,335 Domestic: 87.3% (4,075,463) Commercial: 9.2% (428,132) Industrial: 0.2% (8,870) Government Permits: 0.1% (6,480) Government Quarters: 3.2% (148,390)	Complaints	No. of Complaints: 855,574 Billing: 84.5% (723,221) Desludging: 9.3% (79,932) Others: 0.7% (5,703) NPS: 4.7% (40,071) STP: 0.8% (6,647)	
Workforce (Sewerage Operator)	No. of Staff: 3,407 STP & Treatment: 1,377 Network: 293 Desludging: 392 Operating & Planning: 1,044 Others: 301	Last Revision (Water Rates)	Refer to page water rates by state		Last Revision (Sewerage Rates)	Refer to page sewerage rates by IWK

EVOLUTION OF SEWAGE TREATMENT TECHNOLOGIES



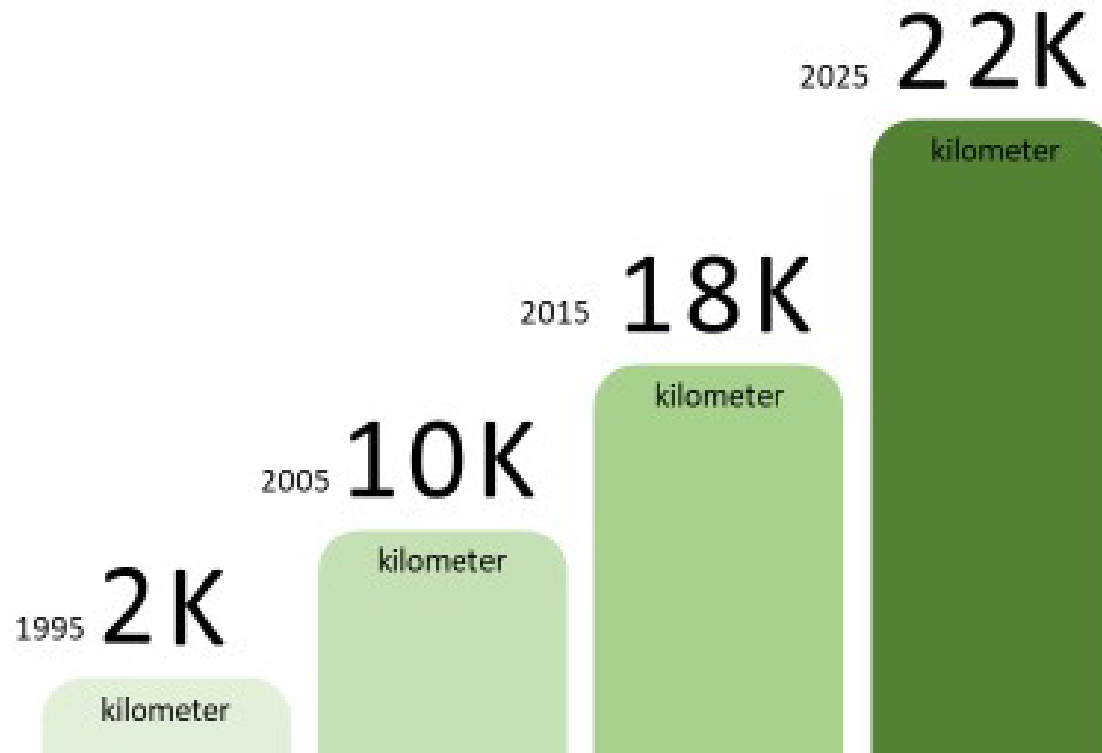
Sewer system implementation





Growth of sewer pipelines through trenchless technologies application

Malaysia's sewerage infrastructure has expanded significantly over the past few decades. As of January 2025, the national sewerage operator, **Indah Water Konsortium (IWK)**, manages approximately **22,000 kilometers** of sewer pipelines, a substantial increase from **2,317 kilometers** in 1994



Pantai 2 regional STP – 1.4million PE



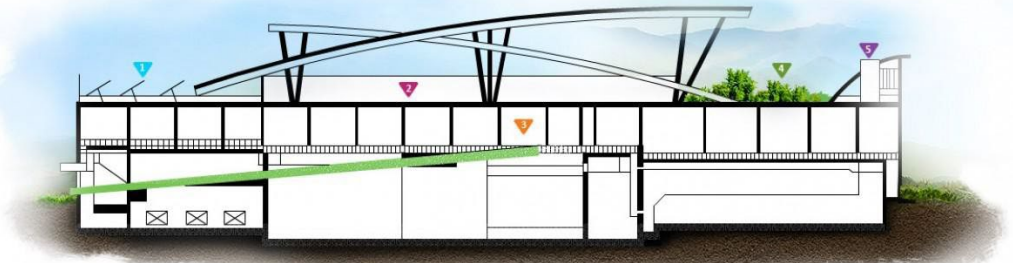
IWK chief executive officer Faizal Othman said the move was possible because P2STP has recently adopted the Advance Anaerobic-Anoxic-Oxic (Advance AAO) process. — fotoBERNAMA



Langat Centralised Sewage Treatment Plant (CSTP) – 920K PE



1 Solar Farm 2 Sports Facilities 3 Maintenance Room 4 Amenities Podium 5 Changing Room



Features	Facilities	Technologies
<ul style="list-style-type: none"> Grit Chamber before Main Pipe Step-feed Multi Stage DeNitrification with deep aeration Balancing Tank 24/7 Operation of Sludge Treatment Facilities 	<ul style="list-style-type: none"> One (1) Community Hall Two (2) Futsal Courts Sixteen (16) Badminton Courts Two (2) Sepak Takraw Courts Two (2) Basketball Courts 	<ul style="list-style-type: none"> Solar Energy The Uses of Bio-Gas Rainwater Harvesting Effluent Water Reuse



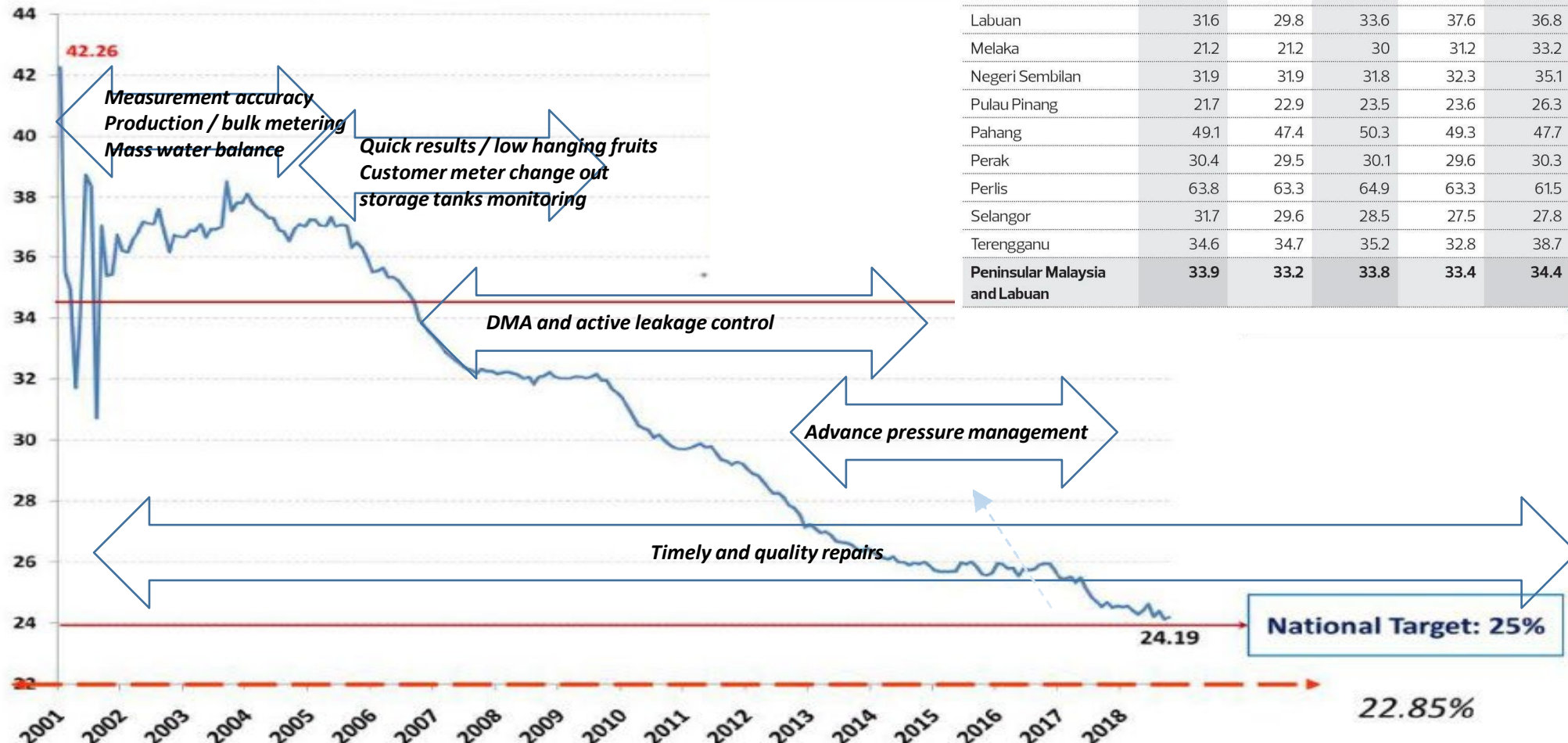
- The project includes laying approximately 105 km of a sewer network of different pipe sizes.
- The works include the underground installation of sewers with sizes ranging from 225 mm to 1800 mm diameter, in challenging ground conditions.
- ND1800 mm curved microtunnel, for a total length of 726 m: a record for the country, which is inscribed in the Malaysia Book of Records
- longest ND1800 mm sewer laid by microtunnelling in rock, a 515-m long, s-curved ND1800 drive crossing a granite formation (160 Mpa)

Non Revenue water reduction levels

Non-revenue water level by state (%)

STATE/FEDERAL TERRITORY	2018	2019	2020	2021	2022	2023
Johor	24.8	24.9	26.7	25.1	26.3	25
Kedah	48.5	48.5	48.4	49.9	51.5	50.7
Kelantan	49.3	50.8	51.7	52.6	53.7	54.5
Labuan	31.6	29.8	33.6	37.6	36.8	37.6
Melaka	21.2	21.2	30	31.2	33.2	35.1
Negeri Sembilan	31.9	31.9	31.8	32.3	35.1	38.9
Pulau Pinang	21.7	22.9	23.5	23.6	26.3	26.8
Pahang	49.1	47.4	50.3	49.3	47.7	47.7
Perak	30.4	29.5	30.1	29.6	30.3	30.2
Perlis	63.8	63.3	64.9	63.3	61.5	64.5
Selangor	31.7	29.6	28.5	27.5	27.8	27.8
Terengganu	34.6	34.7	35.2	32.8	38.7	40.1
Peninsular Malaysia and Labuan	33.9	33.2	33.8	33.4	34.4	34.6

THE EDGE



Pipeline inspection

- Identify defects - mains leak detection methods (underwater CCTV, smart balls etc)
- Pipe condition assessment
- AI Driven predictive modelling
- Digital Twins

Pipeline rehabilitation strategies

- Alternatives/complement to pipe replacement programme
- Pipe repairs rehab (CIPP, slip lining etc)

Non Revenue water – key issues for pipeline rehabilitation

Material	Total Length (km)	0–20 yrs	20–40 yrs	40–60 yrs	>60 yrs
AC	44,282	0	4,400	31,000	8,900
MS	29,372	8,800	14,700	5,300	600
HDPE/PE	22,111	15,500	6,600	0	0
uPVC	18,683	5,600	10,300	2,800	0
DI/CI	9,885	2,000	4,000	2,400	1,500
Others	2,942	1,500	900	400	100
Total	127,275	33,400	40,900	41,900	11,100

key findings

- Approximately **53,000 km (42%)** of Malaysia's network is likely **older than 40 years**. This is consistent with reports that nearly one-third of the network consists of AC pipes beyond their intended service life.
- AC pipes are the dominant ageing asset. Recent reports indicate **39,287 km of AC pipe** are already beyond their 30-year design life, with many over 50 years old.
- New replacements are primarily **HDPE, ductile iron, and mild steel**, meaning most network growth during the last two decades falls into those materials.
- In Selangor alone, roughly **5,000 km of AC pipe** remain in service after replacement efforts.

'USEFUL LIFE' SHORTER THAN IT SHOULD BE

Average Pipe Age in Municipal Systems

- **Drinking water systems:** ~45–50 years on average
- **Wastewater systems:** ~30–40 years on average
- **Stormwater systems:** Varies widely, often older and less maintained

Air Selangor, the primary water services provider for Selangor, Kuala Lumpur, and Putrajaya, has identified that approximately **55% of damaged pipes due to aging were installed in the 1980s**. This indicates that a significant portion of the infrastructure is over 40 years old. [Hydro Hub | Air Selangor](#)

Pipe Replacement Programme: To address this, Air Selangor initiated a 30-year Pipe Replacement Programme in 2016, aiming to replace over **5,600 kilometers of old pipes**. As of March 2024, they have successfully replaced **636.55 kilometers**. [Hydro Hub | Air Selangor+1](#)[Hydro Hub | Air Selangor+1](#)

Thank You

For more info visit our website at:

www.matt.org.my

