Small and Decentralized Water System

Lecture 5: Small to medium-size water management system

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Presentation outline

- Introduction
- Reasons for upgrading
- Upgrading procedures
- Issues and constraints

Introduction

- Financial models
- Small-sized?
- Privately owned water and wastewater systems
- Communal system
- Enlarging community, enlarging housing estates
- Environmental pollution control
- O&M issues

Question 1

- Is wastewater management a profitable business?

Reasons for upgrading

- Economy of scale
- Numerous, uncontrollable units
- Standardization of services, O&M
- Replacement, refurbishment of old plants, sewers
- Improvement of service level
- Existing plant located too close to community
- Cross-subsidy

Buffer zone?

Planning levels and major components

Planning levels	Key aspects
Strategic planning	Global Water Management, Inter-basin Transfer
Catchment planning	Baseline condition Assessment, Modeling, Water Quality Objective, Supporting Plans
System & management planning	Nutrient Reduction Program, STP Rationalization Study, Sewerage plan, Licensing. etc
Specific project planning & investigation	Individual Project Investment, EIA, Hazops

Question 2

- Who suppose to plan for the sewerage and water management?

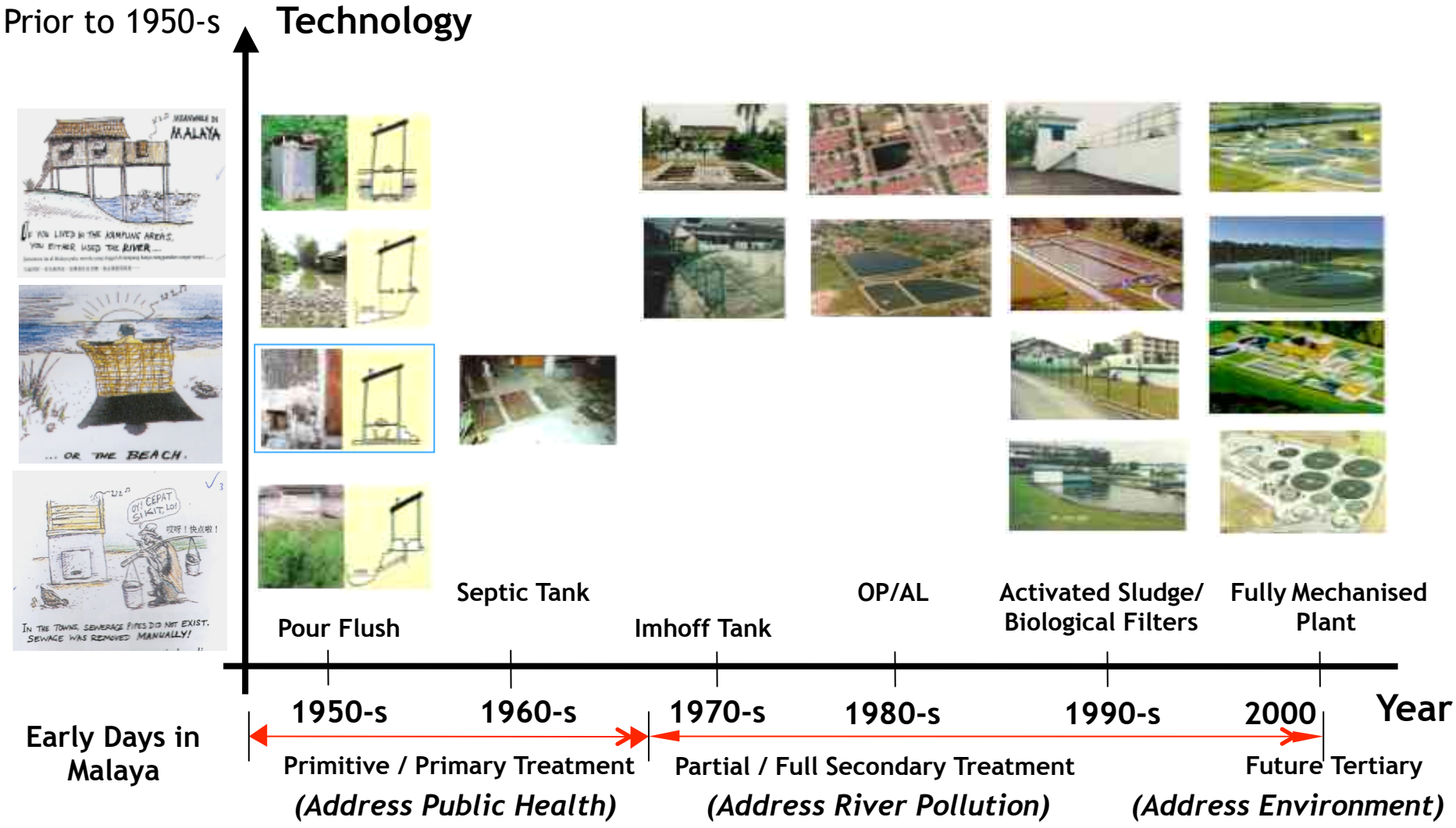
Question 3

Priority list

- Water supply >>>> sewerage facilities?

- How to reverse or equate the priority?

Evolution of Sewerage Systems in Malaysia

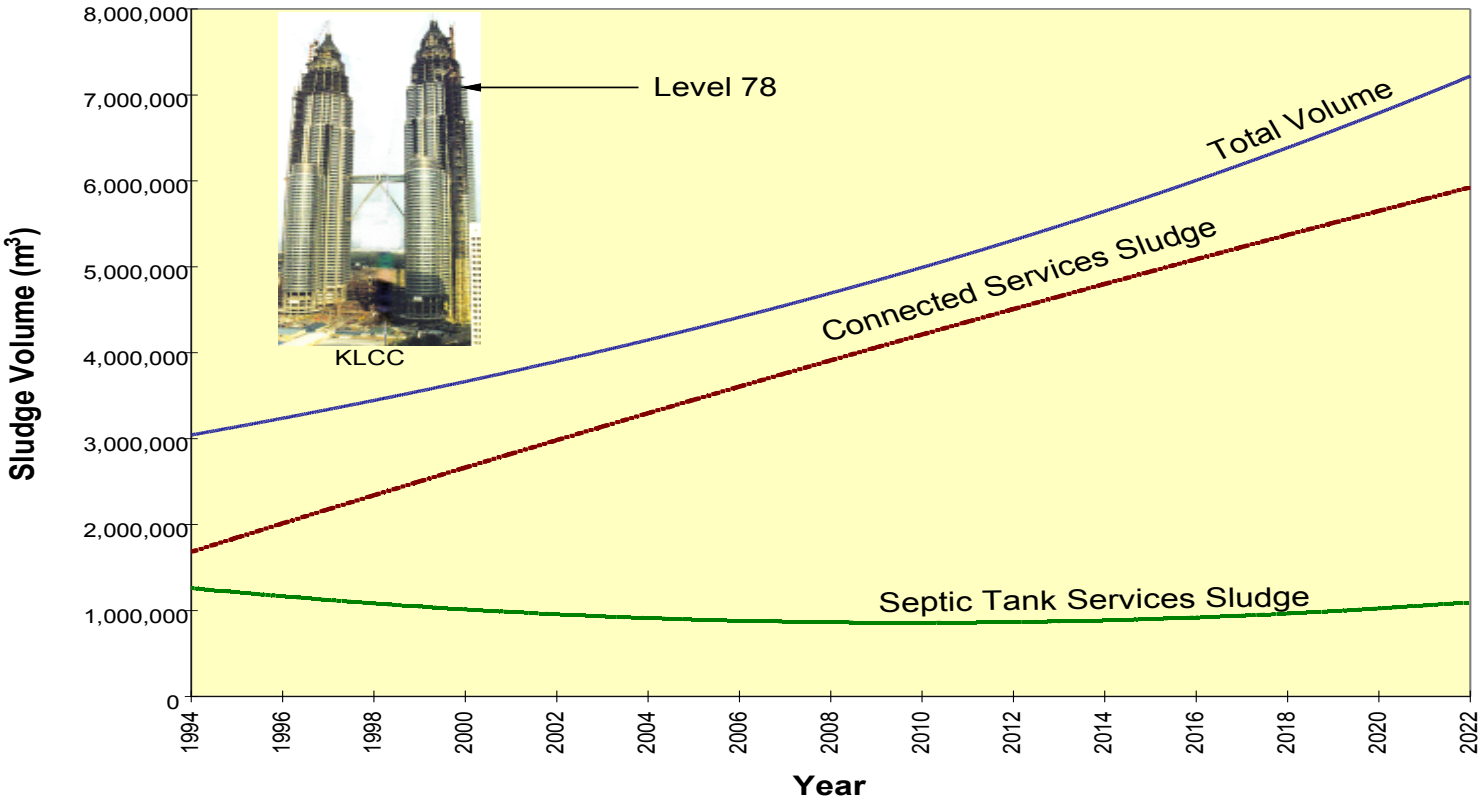


Breakdown of Sewage Treatment Facilities (2002)
Malaysia

PE Range	CST	IT	OP/ AL	MP	NPS	Total	Plant (%)	Total PE (Est)	PE (%)
<150	3,306	179	96	340	41	3,962	54.1	269.465	2.8
151-1,000	511	594	117	532	159	1,913	26.1	1,031,735	10.6
1,001-5,000	41	151	374	527	37	1,130	15.5	3,060,338	31.5
5,001-10,000	3	4	72	103	9	191	2.6	1,618,436	16.6
>10,000	1	0	64	50	7	122	1.7	3,743,574	38.5
Total	3,862	928	723	1,552	253	7,318	100.0	9,723,548	100.0

PE: Population Equivalent ■ CST: Communal Septic Tanks ■ IT: Imhoff Tanks ■ OP/AL: Oxidation Pond/Aerated Lagoon ■ MP: Mechanical Plants ■ NPS: Network Pumps Station ■ The rest of the population used individual septic tanks

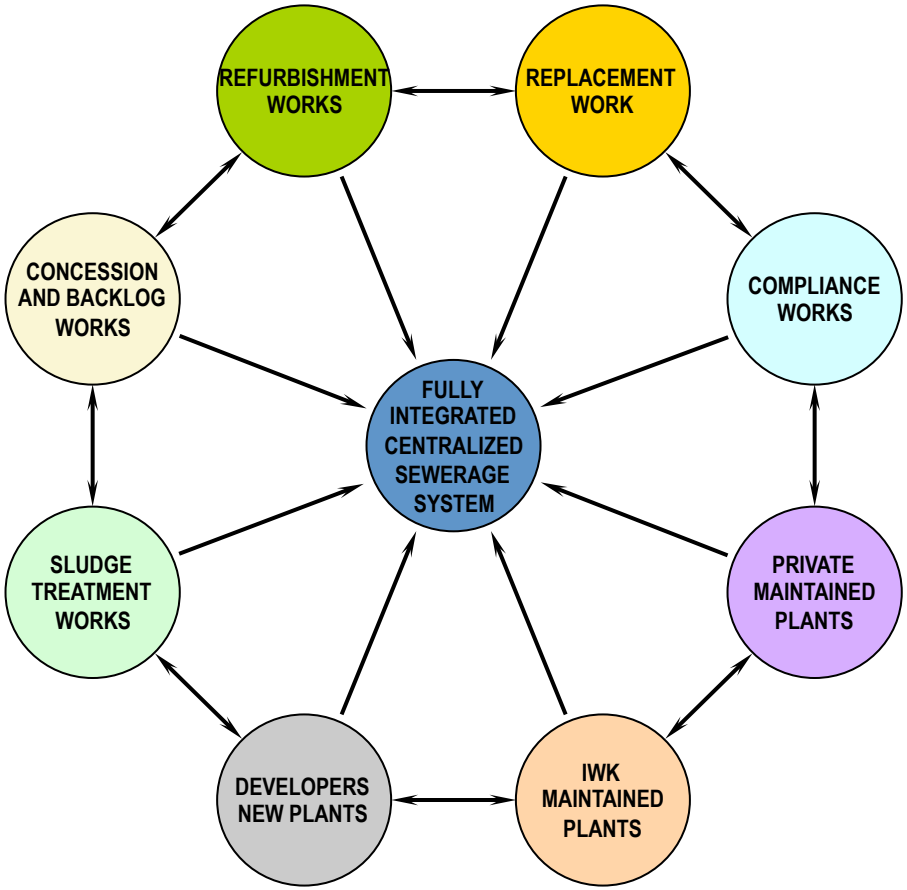
Estimated sludge quantities in Malaysia



Policy guidelines

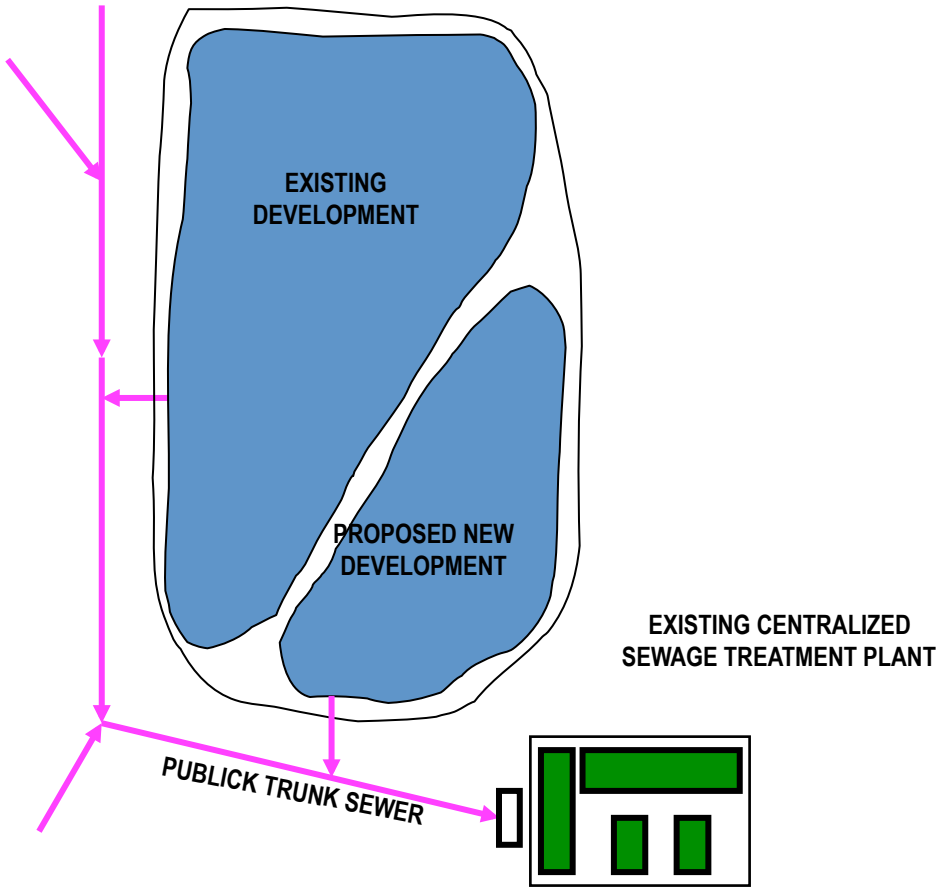
- Meeting effluent standards
- Able to operate and maintain
- Land requirement
- Aesthetically and environmentally acceptable
- Most cost-effective option
- Promotion of local enterprise
- Need for pioneering effort by contractors
- Tertiary treatment systems

Sewerage Catchment Planning & Strategy



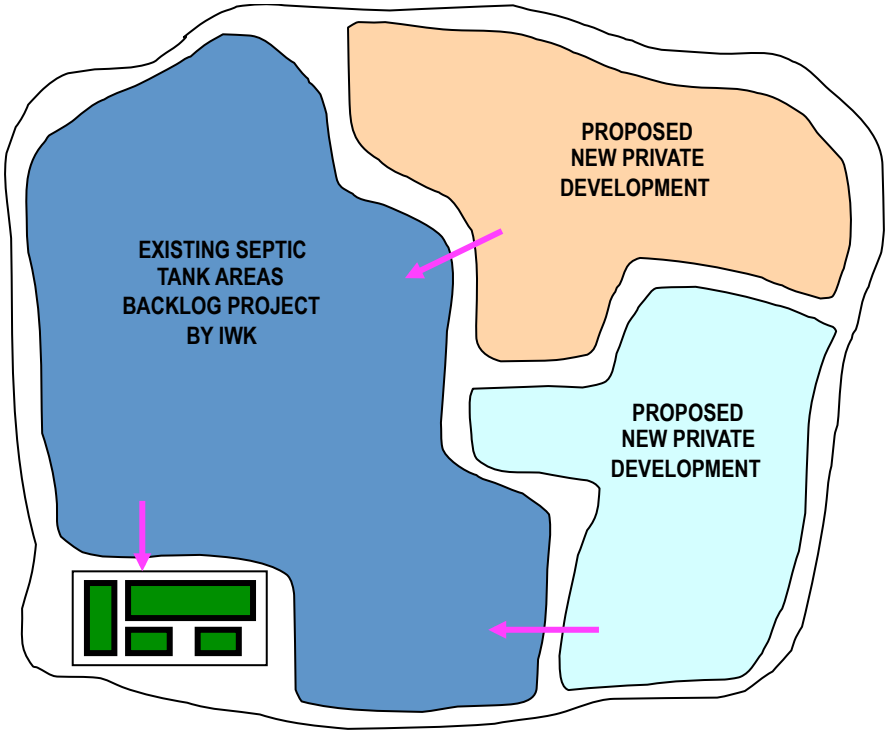
Scenario 1: Link to Existing Centralized Sewerage System

- All developments within the central sewer catchment should connect to existing sewer network.
- The capacity for the network and treatment plant shall be checked and upgraded for serving the new growth areas



Scenario 2: Link-up the proposed treatment network & plant under the multipoint projects

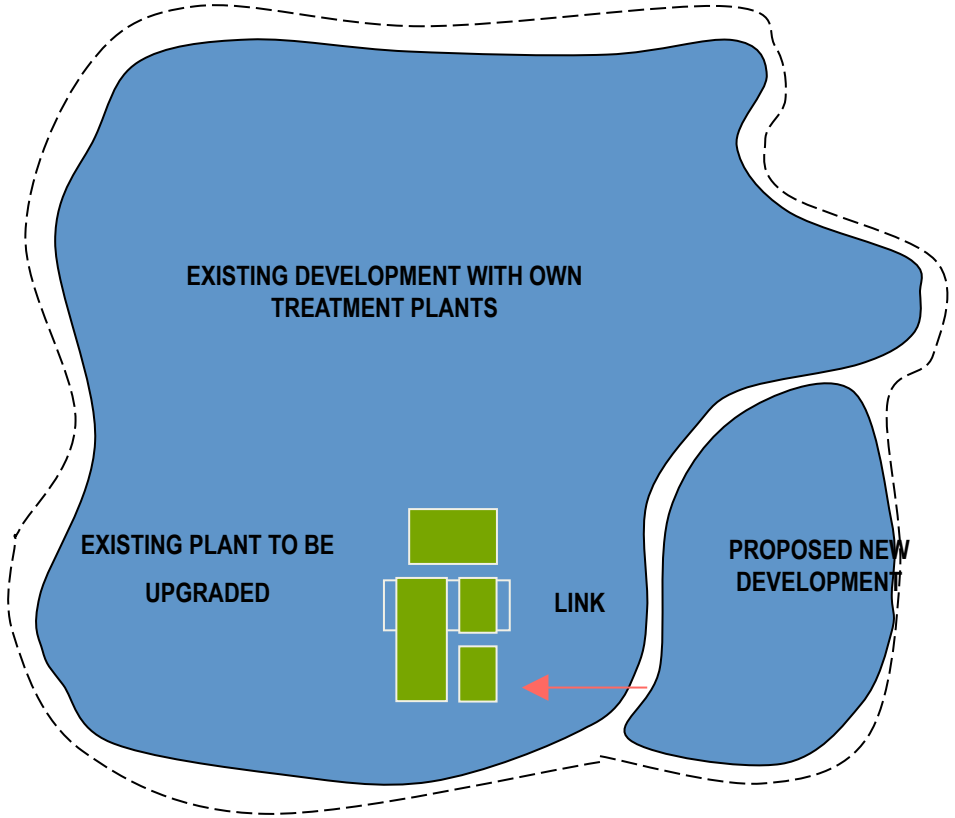
- The new sewerage projects under Indah Water's Backlog Programme shall consider upstream developments so that the sewers could be seized to receive future flows form these development



PROPOSED MULTIPOINT
SEWAGE TREATMENT PLANT
(to be sized to cater for new development)

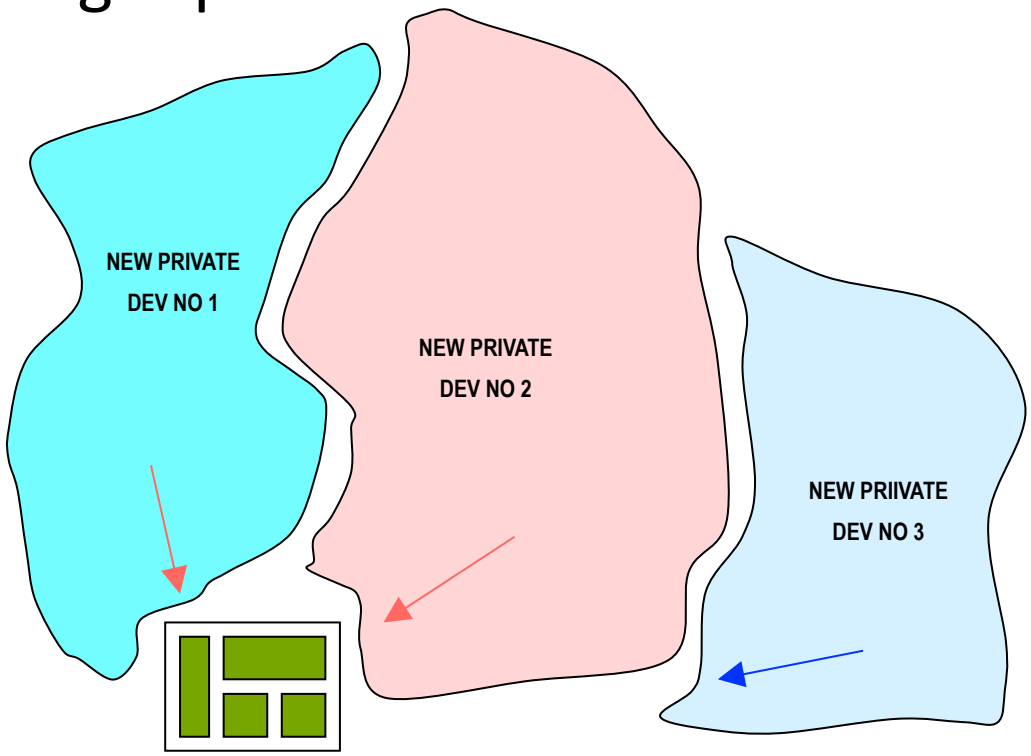
Scenario 3: Upgrade existing treatment plant at adjoining housing schemes

- An existing plant can be upgraded where possible, to receive the requisite flow from an immediate development. This will ease on maintenance and nuisance issues of additional new treatment plants



Scenario 4: Collaborative effort between two or more private developers to jointly build a single larger plant

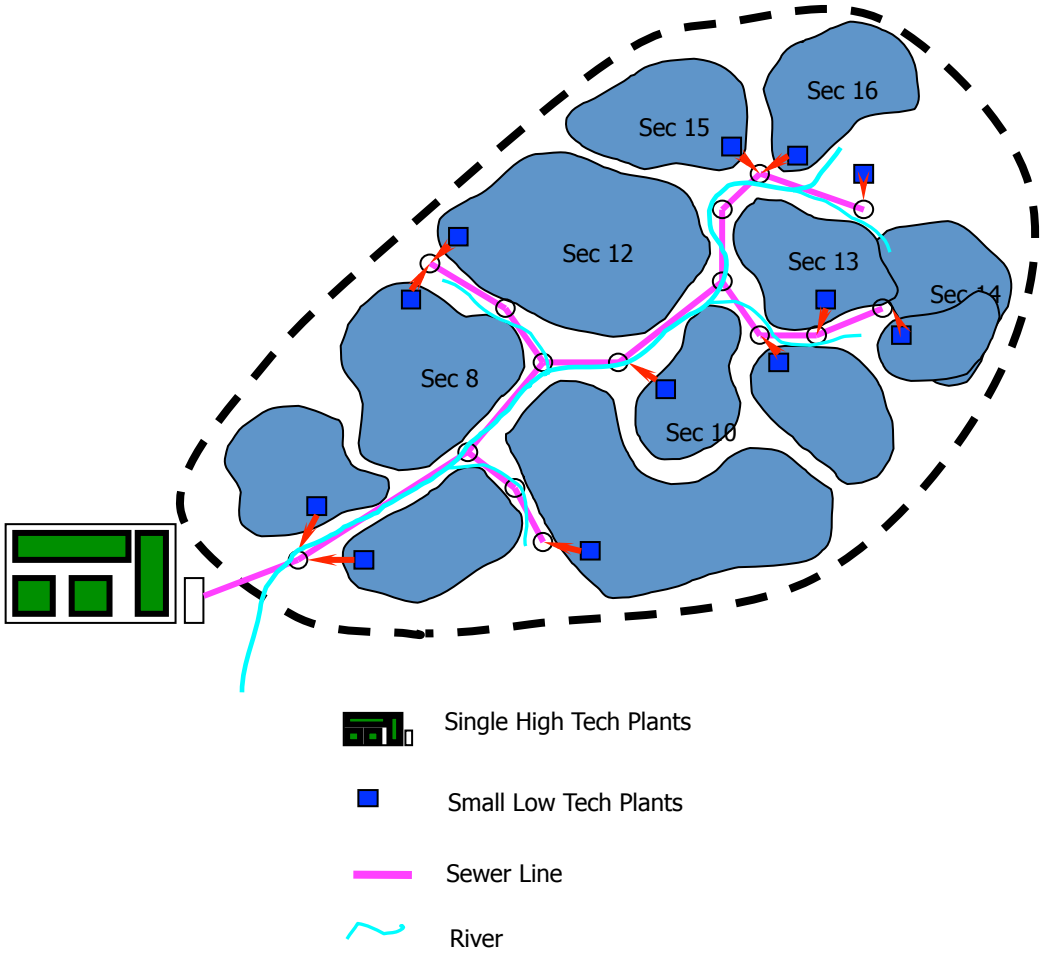
- If new developments are sprouting within the catchment, a new location for a central treatment could be provided.
- A trunk sewer line could be designed to receive all the sewerage flows before discharging into the proposed treatment plant



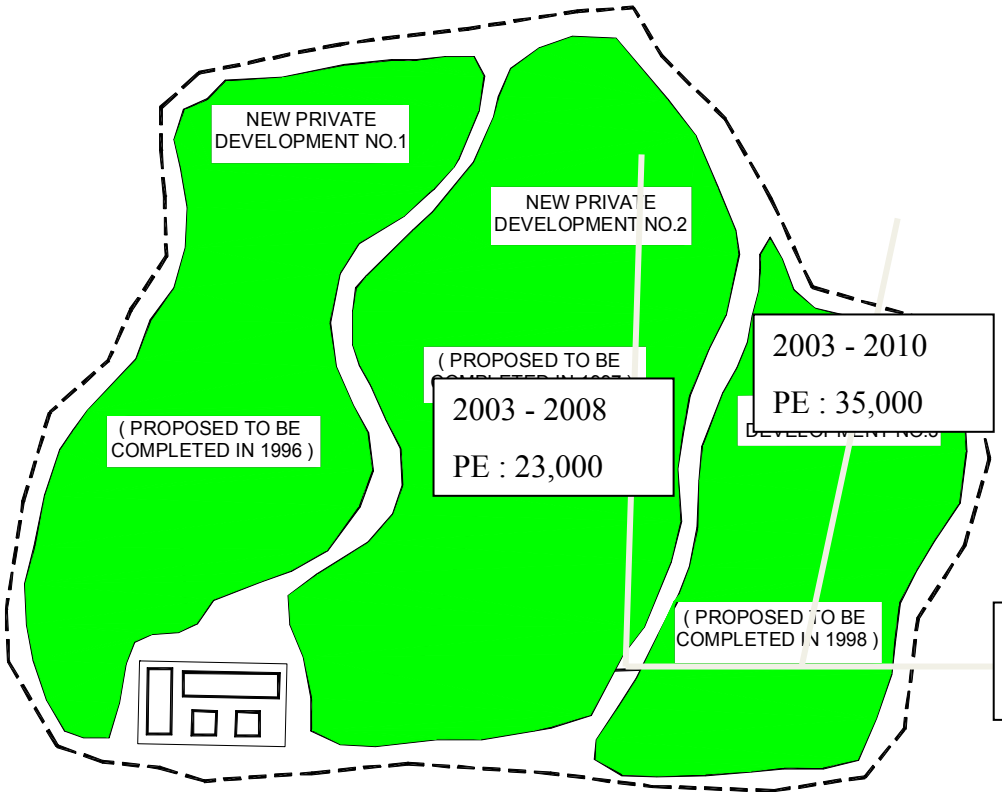
A SINGLE NEW PLANT TO CATER FOR THREE DIFFERENT DEVELOPMENTS

Scenario 5: Rationalization of existing small low -tech plant to a single new hi-tech plant

- Most of the existing developments fall under this category. These developments, however small, have built sewerage treatment systems.
- It becomes effective to link all these treatment systems into a central treatment plant.
- The sewer and treatment system shall be designed to suit land area made available



Developer driven catchment strategy: Collaborative effort between 2 or more private developers (no additional PE)



A SINGLE NEW PLANT TO CATER FOR THREE DIFFERENT DEVELOPMENTS

Ult. PE : 75,000

Formula on cost sharing, construction and payment schedule and implementation agency to be agreed between developers for:

- land
- trunk sewers
- inlet works
- STP modules

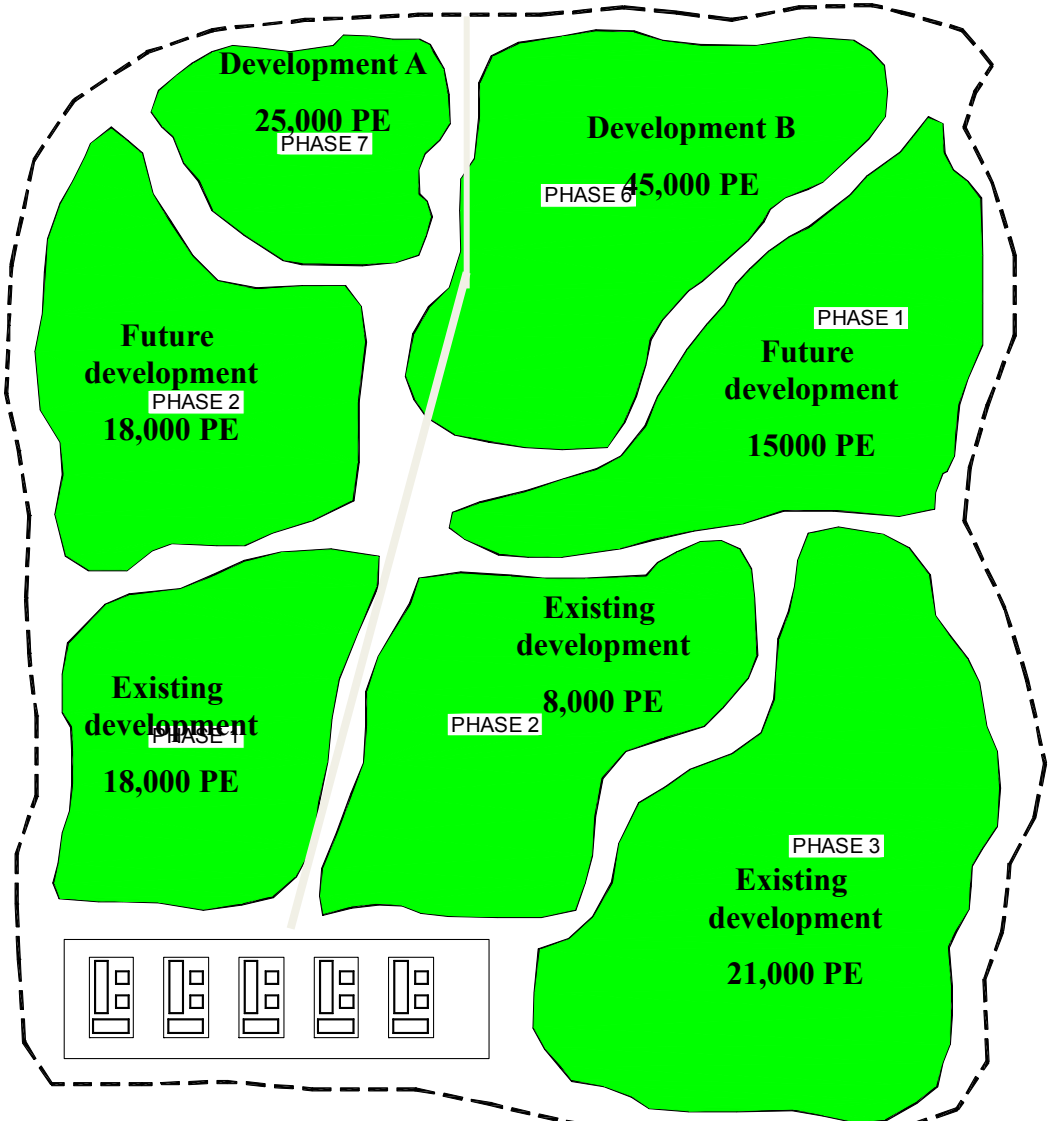
Developer Driven Catchment Strategy : Collaborative Effort between two or More Private Developers - additional external PE from ex & future development

New STP: Ult PE 150,000

Developers PE: 70,000

Ex development PE: 47,000

Future development PE:33,000



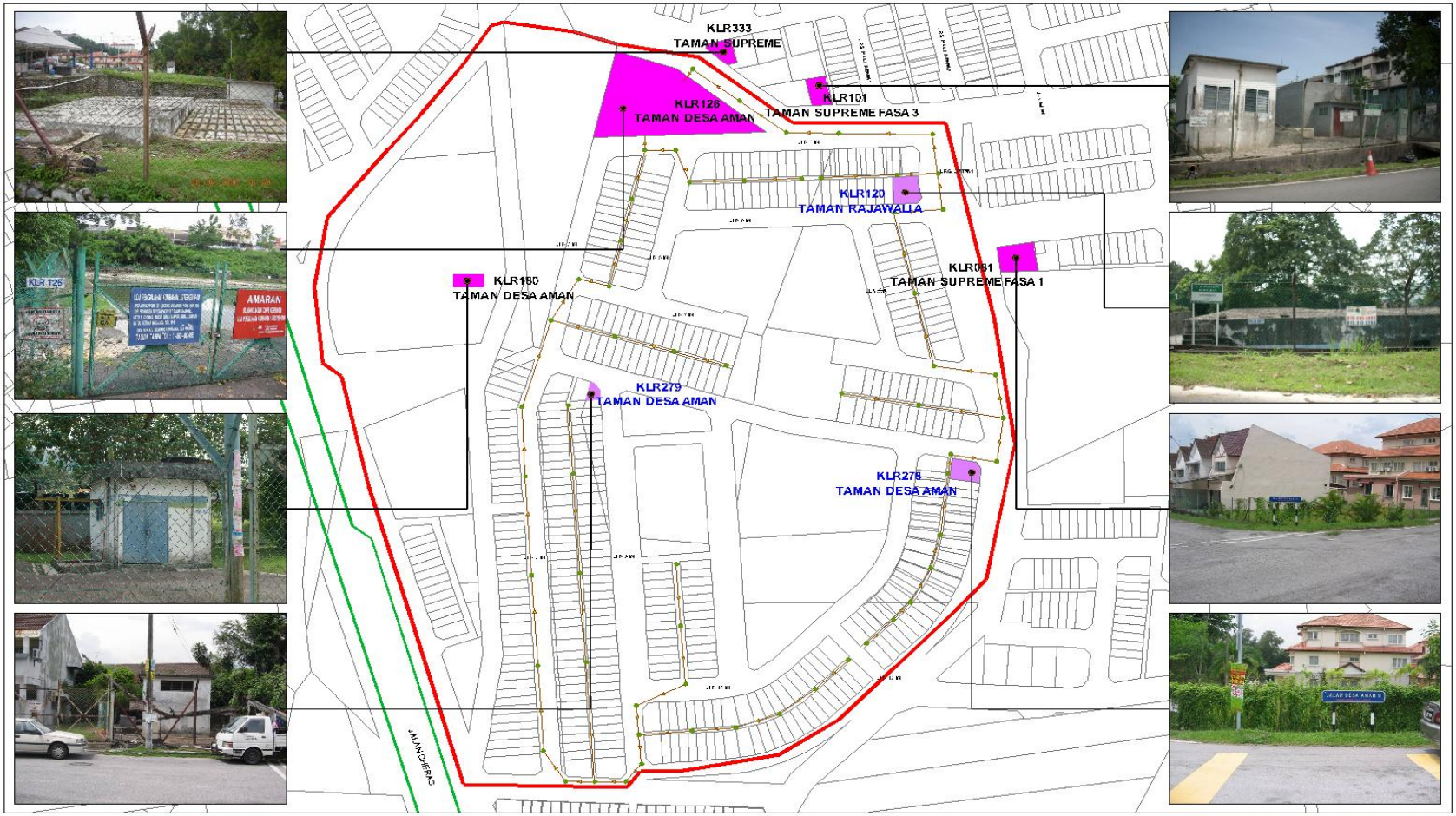
Operation & Maintenance of STPs

- O & M gets more challenging as STP numbers increase
- Only large size plants are manned
- Out of 233, only 9 regional plants are manned

- Method of Operation & Maintenance
- Equipment Function Monitoring
- Cleaning
- Preventive Maintenance
- Aesthetic-Safety Maintenance

Operation & Maintenance of STPs

- Development and implementation of the Sewerage Development Strategies forms the basis in determining the appropriateness of any sewerage systems for Malaysian urban centers.
- The Strategies outline the basic approach and the mechanism in achieving the required targets.
- Technological and funding alternatives could be evaluated based on specific criteria and regulatory intervention becomes necessary in order to keep the implementation plan on track.
- The involvement of the private sector in this respect has always been vital to support the implementation program & to spearhead the growth in the sewerage sector.



ASSET NO	TYPE	STPNAME	LOCATION	cPE	dPE	CORREMARK	LAND STATUS	PROPRIETOR	AREA [HA]	LOT NO.	DECOMMISSION DATE	LAND VALUE (RM)	LAND REMARKS
KLR120	ITPS	TMN RAJAWALIA	JALAN DESA AMAN 6	365		PLANT DEMOLISHED & DIVERT TO KLR126	AL-P	HWA - LI DEVELOPMENT SDN BHD	0.044	43370	16-Mac-04	280,575.00	Need to negotiate with owner
KLR126	AL	TAMAN DESA AMAN	JLN 3/101	4146	5000		AL-P	BROADMEW COR SDN BHD	0.519	41662		3,890,250.00	
KLR180	NPS	TAMAN DESA AMAN	BT 5, JLN CHERAS	750			AL-P	BROADMEW COR SDN BHD	0.037	POL 41664		299,200.00	
KLR278	ITPS	TAMAN DESA AMAN	JALAN DESA AMAN 9	1000	1000	PLANT DEMOLISHED & DIVERT TO KLR126	AL-P	HWA - LI DEVELOPMENT SDN BHD	0.037	43308	16-Mac-04	239,940.00	Need to negotiate with owner
KLR279	NPS	TAMAN DESA AMAN	JALAN DESA AMAN 9	500	500	PLANT DEMOLISHED & DIVERT TO KLR126	AL-P	NAGALAGA SDN BHD	0.037	Nil	16-Mac-04	239,940.00	Need to negotiate with owner
KLR081	ITPS	TAMAN SUPREME FASA 1 IPS	JLN JINTAN MANIS 2	1100			AL-P	SUPREME HSG DEV SDN BHD	0.062	35978		403,300.00	
KLR101	ITPS	TAMAN SUPREME FASA III(JBA)	LRG HALIA BARA 1	265			AL-P	SUPREME HSG DEV SDN BHD	0.035	43160		315,900.00	
KLR333	ITPS	TAMAN SUPREME	JLN HALIA BARA	325	325		SL	PTG, WILAYAH PERSEKUTUAN	0.042	53519		339,200.00	

LEGEND :

- PUBLIC PLANTS
- DICOMMISIONED PLANTS
- SERVICE AREA
- LOT BOUNDARY
- MAIN ROAD

TAMAN DESA AMAN CATCHMENT

Overview of Key Issues and Resolution Matrix

Key issues	Resolution
Non-holistic management	Need clear policies, directions & targets.
Low tariff & financial issues	New business model necessary for sustainability.
Collection of sewerage bills	WSIA provides for joint billing with water corporations including disconnection
Compliance to effluent discharge standards	To be included in Business Plans in line with CAPEX targets.
Reducing proliferation of many plants	Implement plant rationalisation via National Sewerage Development Plan.
Lack of comprehensive industry Standards	Standardisation & quality assurance processes
Enhanced enforcement	Address property connection and refusal of septic tank desludging.

Comprehensive Sewerage Management Plan

Sewerage Development plan

1. Existing Sewerage Infrastructure
   - refurbishment
   - upgrading
   - sludge facilities
   - regionalisation
   - property connection
   - sullage (grey water) connection
   - conversion of pour flush
2. New infrastructure to cater growth

Institutional Framework

1. Operation & maintenance
2. Desludging services
3. Training & accreditation
4. Standardisation
5. Education & communications
6. Development Control
7. Research & Development
8. Enforcement & monitoring

Comparison & benchmarking

Country	Service provider, O&M	With water?	CAPEX funding	Full cost tariff?
England & Wales	Private	Yes	Private	Yes
USA	Private & States	Yes	< State	No
Australia	State-own company	Yes	State-owned company	Yes
Japan	Municipality	Yes	Municipality	No
Singapore	State	Yes	State	No
Jakarta, Indonesia	State	No	State	No
Malaysia	State-owned company	No (<2007) Yes (2008)	State & private	No
Sweden	Municipality	Yes	Municipality	

Comparison & benchmarking

Country	Service provider, O&M	With water?	CAPEX funding	Full cost tariff?
Nigeria	State	Only water	State	No
Germany				
South Africa				
Canada	Municipality	Yes	Municipality	No
Denmark				
Butan				
China				
Mozambique				