Categories of Sanitary Landfills

Basis for the Categorized Disposal

- Consistent with the objectives of Sections 37, 40, 41 and 42 of Act which respectively refer to the Closure of Open Dumps, Criteria for Siting, Establishment and the Operation of Sanitary Landfills

- The development requirements is rationalized based on the net residual waste generation of the LGUs

Proposed Minimum Features For Disposal Category Levels

Features	Category 1 ≤ 15 tpd	Category 2 > 15 tpd, ≤ 75 tpd	Category 3 > 75 tpd, ≤ 200 tpd	Category 4 > 200 tpd
Daily & Intermediate Soil Cover	X	X	X	X
Embankment/ Cell Separation	X	X	X	X
Drainage Facility	X	X	X	X
Gas Venting	X	X	X	X

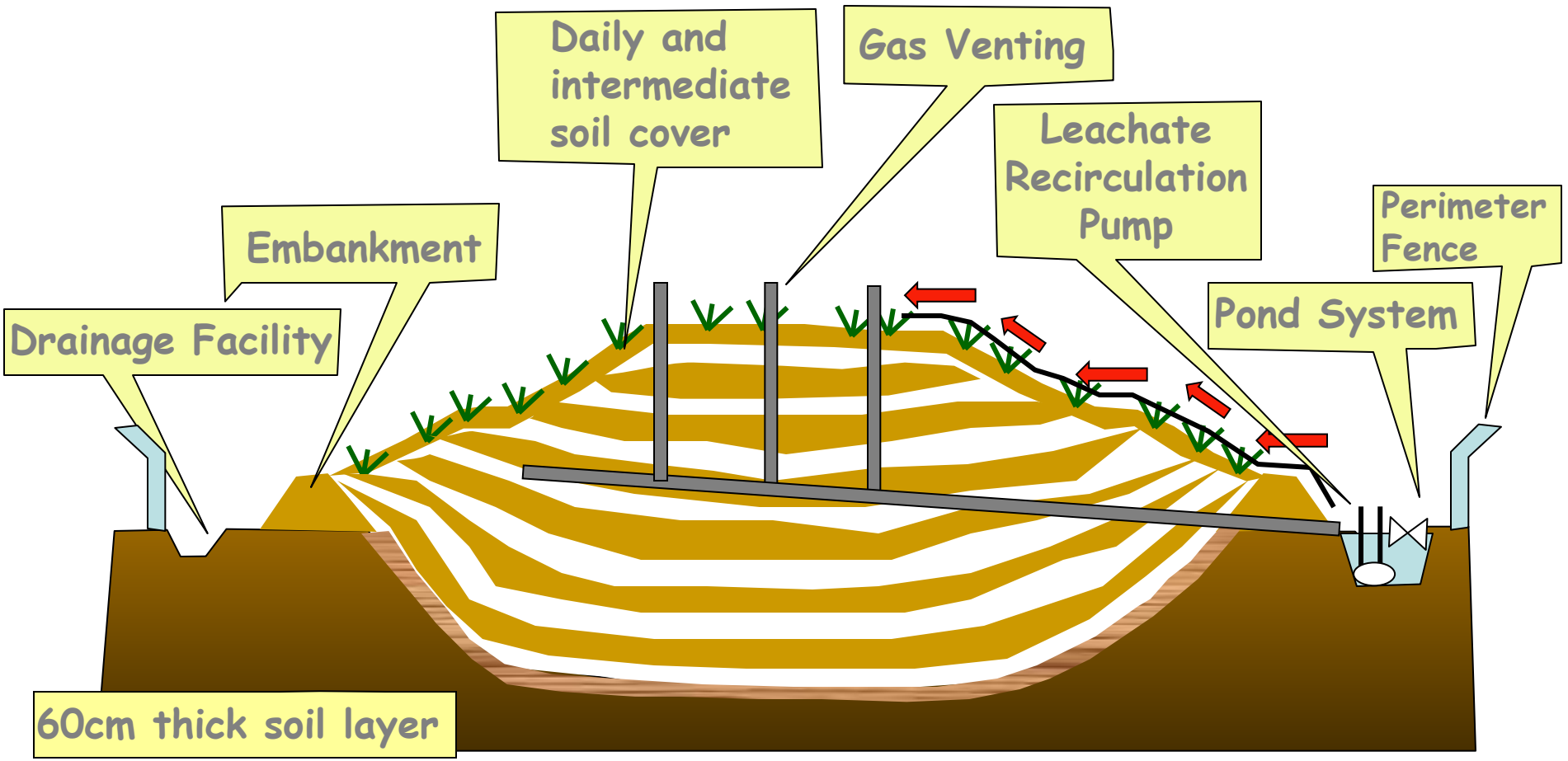
Proposed Minimum Features For Disposal Category Levels

Features	Category 1 ≤ 15 tpd	Category 2 > 15 tpd, ≤ 75 tpd	Category 3 > 75 tpd, ≤ 200 tpd	Category 4 > 200 tpd
Leachate Collection	**x**	**x**	**x**	**x**
Leachate Treatment	Pond System	Pond system	Pond System	Combination of physical, biological & chemical
Leachate Re-circulation	At a later stage of operation	At a later stage of operation	At a later stage of operation	Treatment

Proposed Minimum Features For Disposal Category Levels

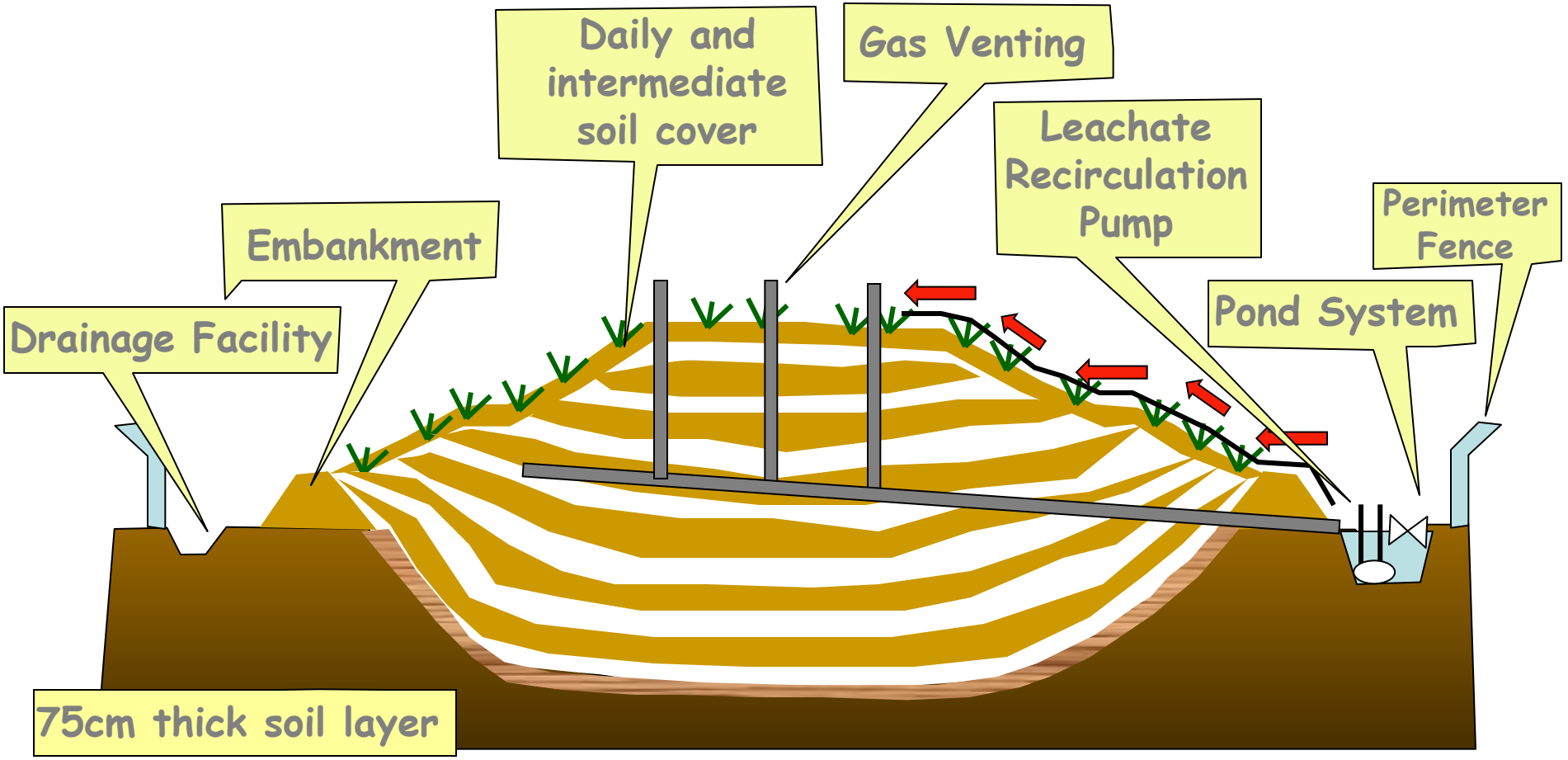
Features		Category 1 ≤ 15 tpd	Category 2 > 15 tpd, ≤ 75 tpd	Category 3 > 75 tpd, ≤ 200 tpd	Category 4 > 200 tpd
Liner	Clay liner	**At least 60 cm thick, permeability of 10-5 cm / sec**	**At least 75 cm thick, permeability of 10-6 cm/sec**		
	Clay liner and/or synthetic liner			**Clay liner at least 75 cm thick with a permeability of 10-7 cm/sec or 1.5 HDPE over 60 cm clay with permeability no less than 10-6 cm/sec**	**Clay liner at least 75 cm thick with a permeability of 10-7 cm/sec or 1.5 mm HDPE over 60 cm clay with permeability no less than 10-7cm/sec**

Disposal Category 1



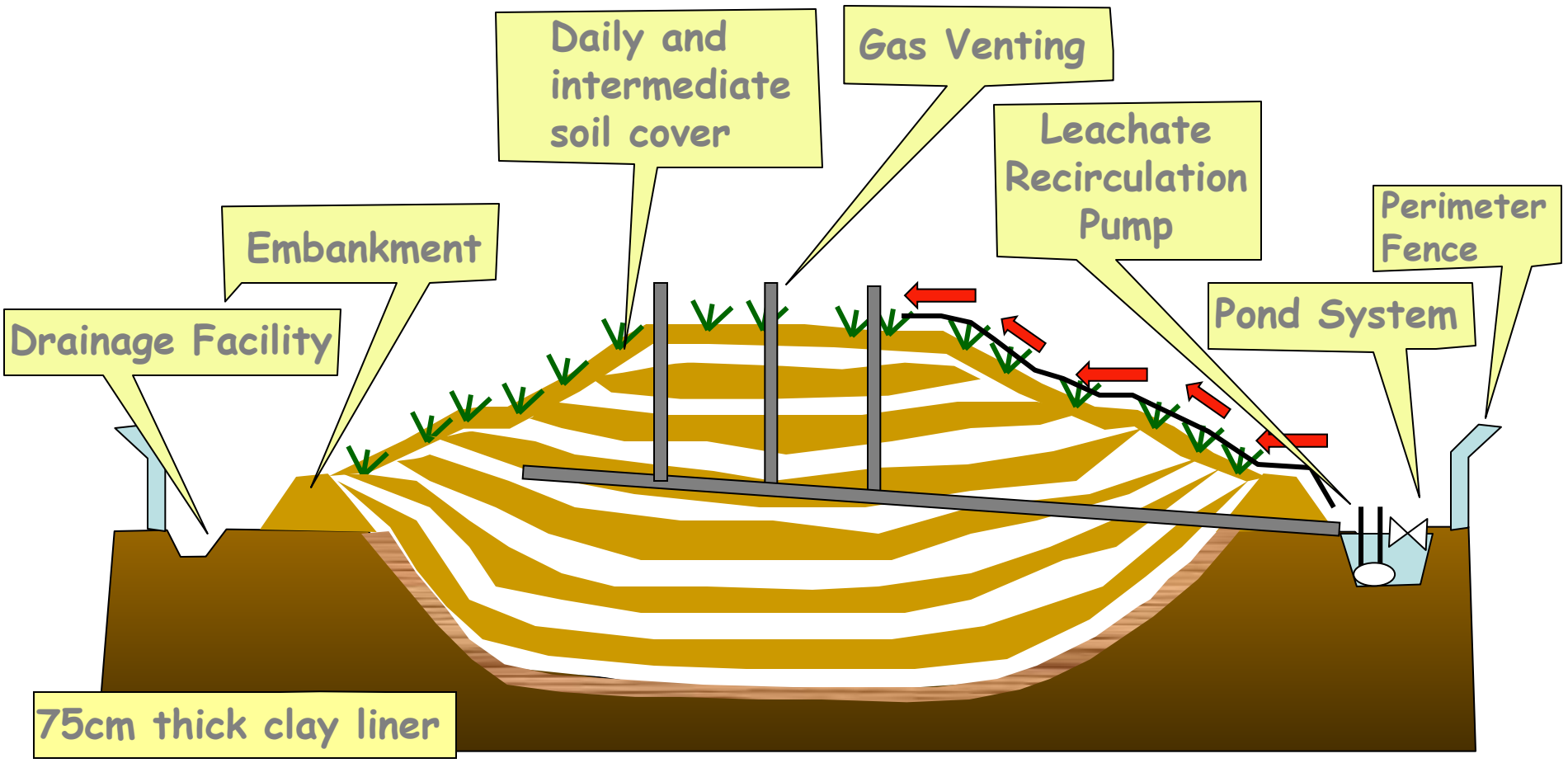
- Cell Separation System for inert and stable residual waste
- Leachate collection pipes and re-circulation system be provided at the later stage of operation
- soil liner/layer with permeability of 10^{-5} cm/sec

Disposal Category 2



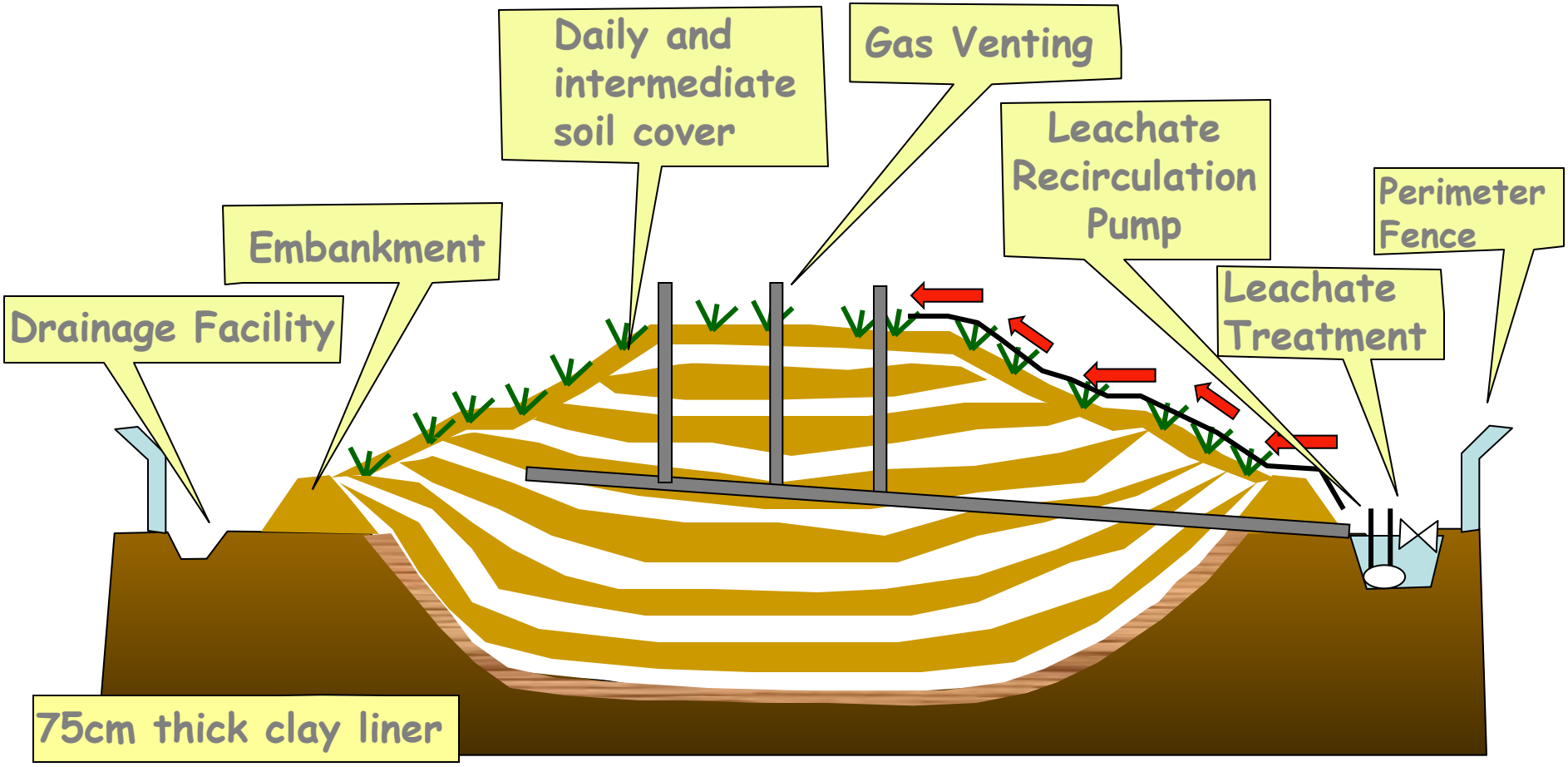
- Cell Separation System for inert and stable residual waste
- Leachate collection pipes and re-circulation system be provided at the later stage of operation
- Soil liner/layer with permeability of 10^{-6} cm/sec

Disposal Category 3

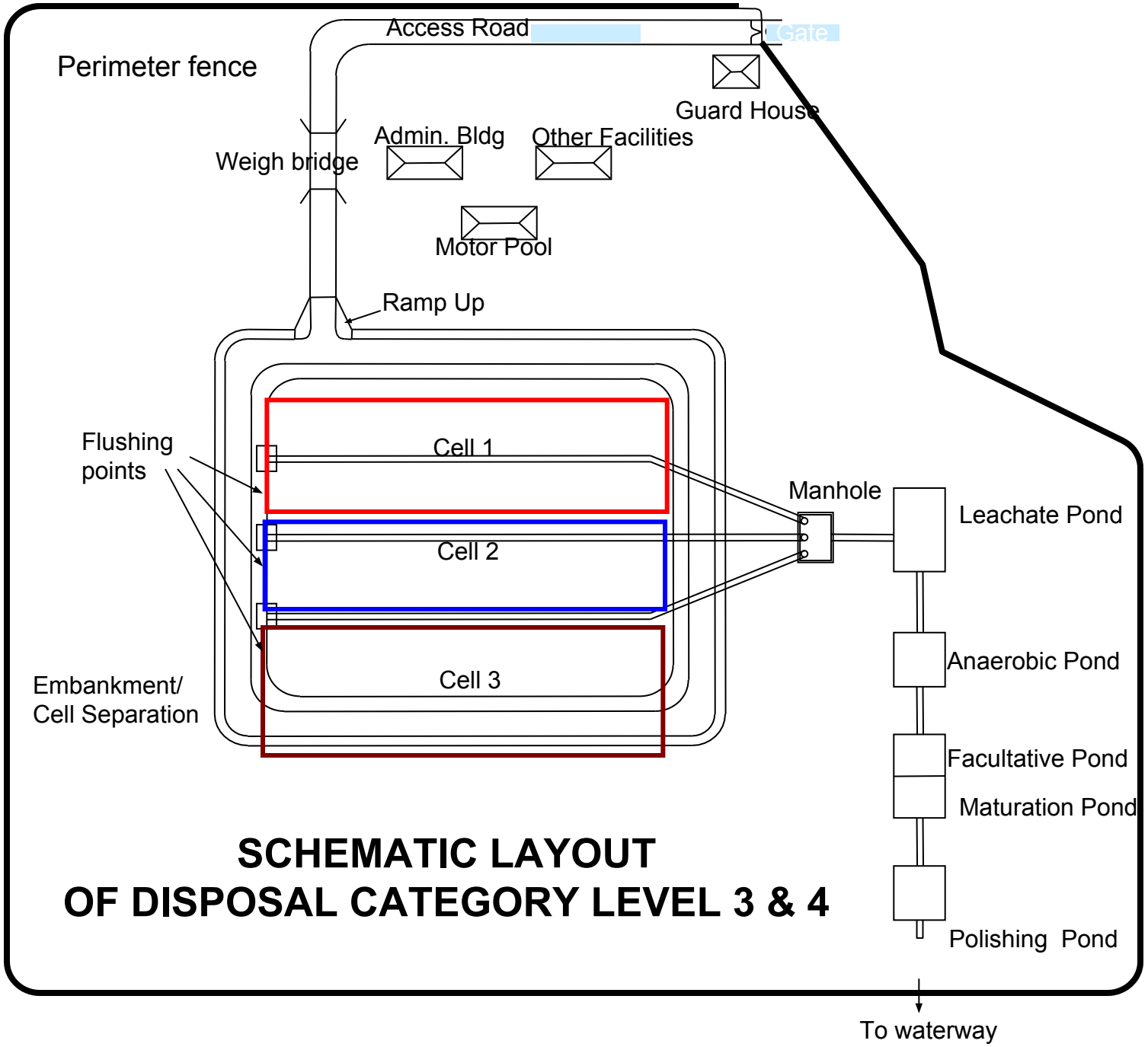


- Cell Separation System for inert and stable residual waste
- Leachate collection pipes and re-circulation system be provided at the later stage of operation
- Soil liner/layer with permeability of 10^{-7} cm/sec or an HDPE Liner (1.5mm thickness) over a 60cm thick clay layer with permeability of 10^{-6} cm/sec

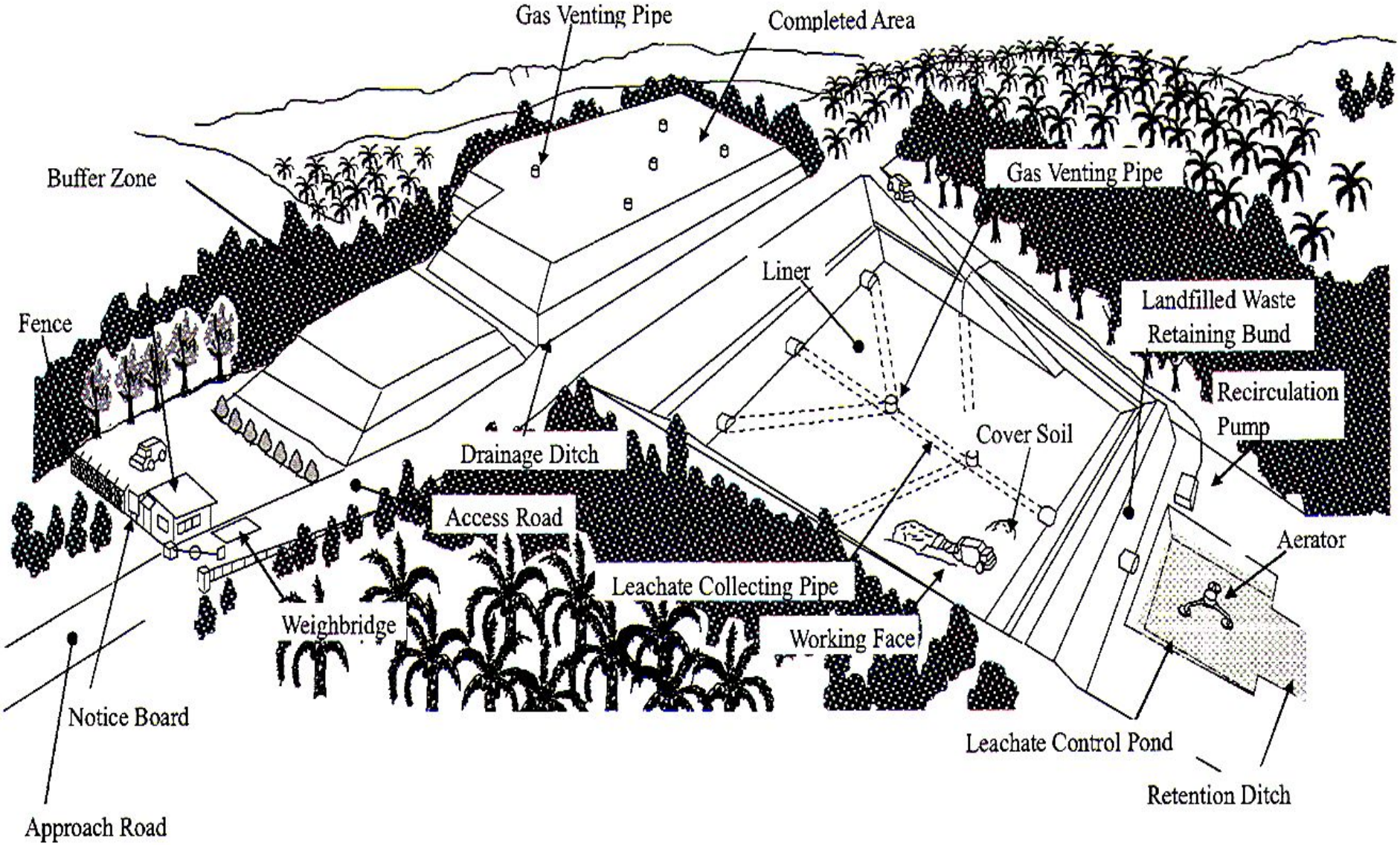
Disposal Category 4



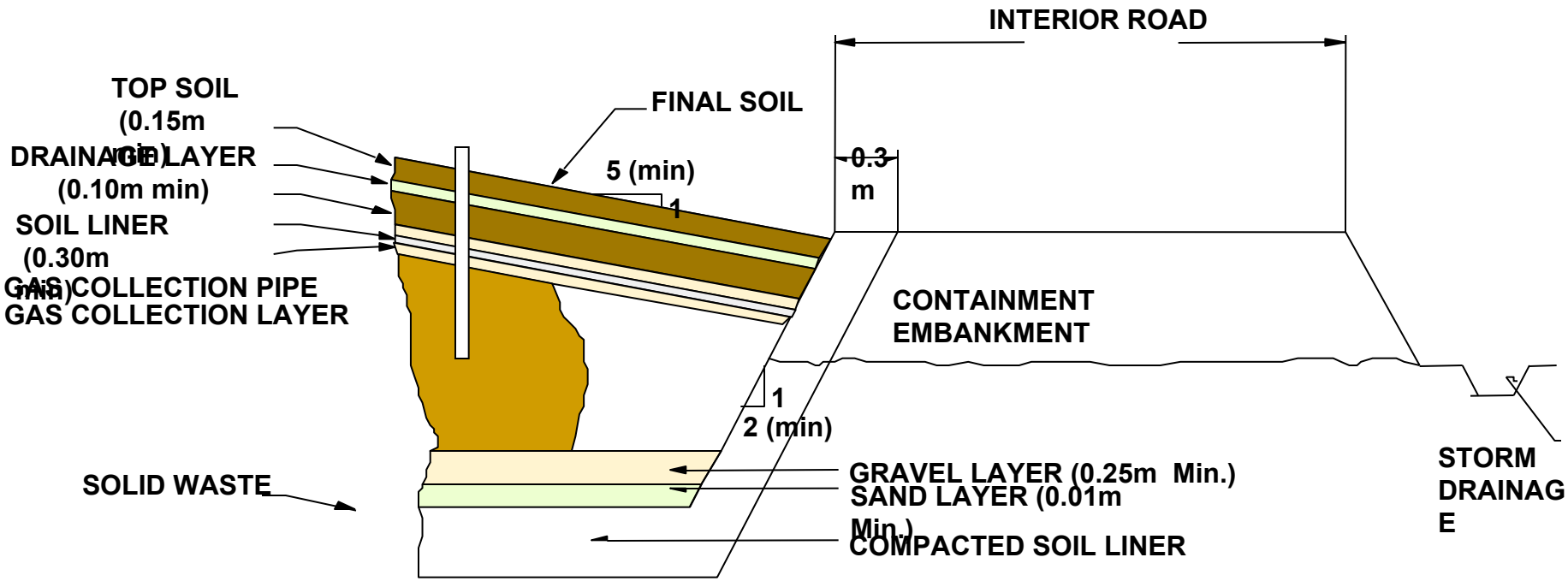
- Cell Separation System for inert and stable residual waste
- Leachate treatment will be a combination of physical, biological and chemical
- clay liner/layer with permeability of 10^{-7} cm/sec or an HDPE Liner (1.5mm thickness) over a 60cm thick clay layer with permeability of 10^{-7} cm/sec



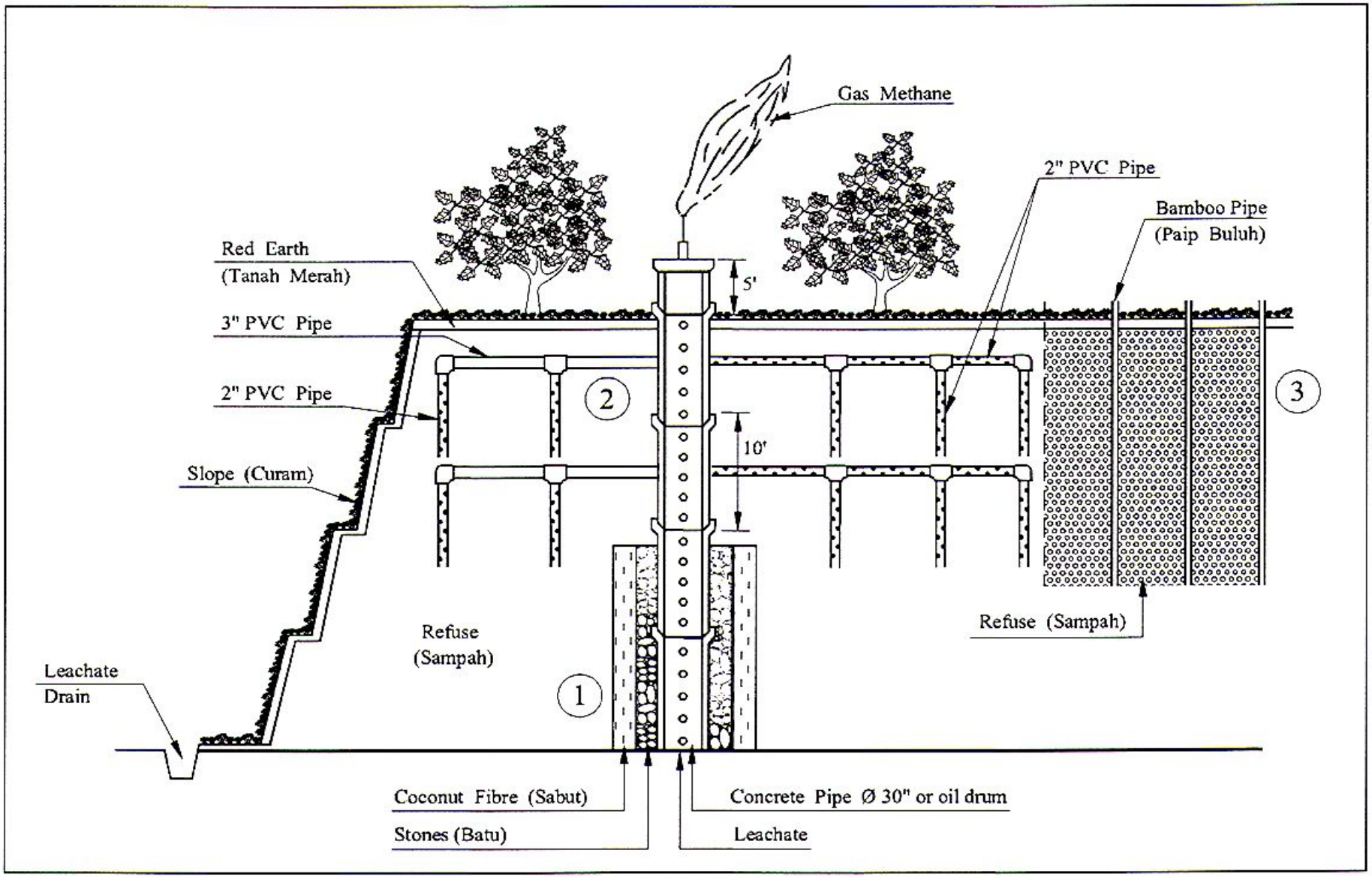
SCHEMATIC LAYOUT OF DISPOSAL CATEGORY LEVEL 3 & 4



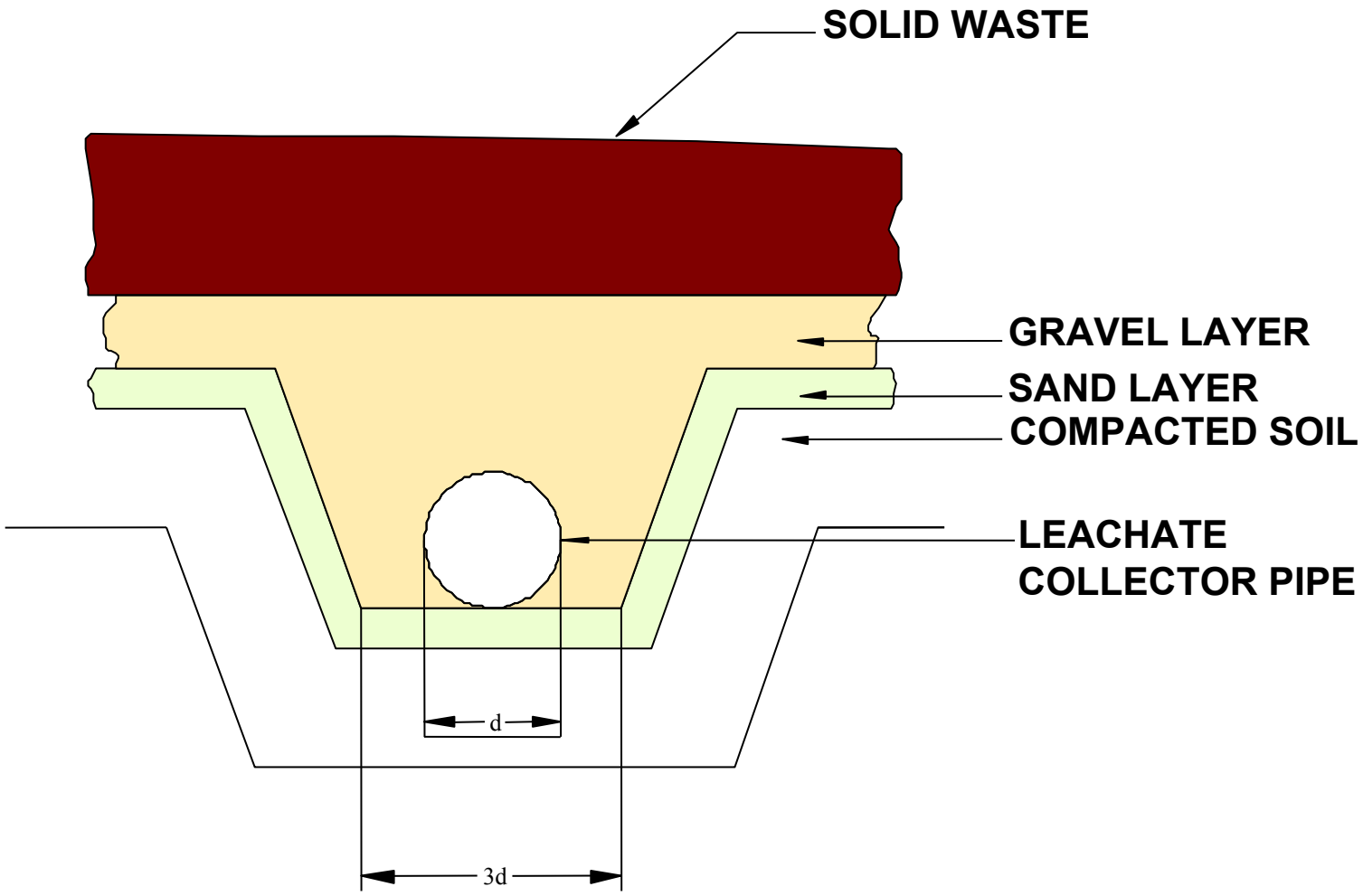
Typical Sanitary Landfill System



Section through a Disposal Facility



Example Gas Venting Facility



Section through a Leachate Collection System

Minimum Operational Requirements to Cover All Categories

- Meet the Siting Criteria for SLF as specified in RA 9003 and its IRR
- Planned capacity
- Site preparation and containment engineering
- Waste compaction to achieve minimum specified target densities
- Operational manual of procedures
- Fence, gate and other site infrastructure with surfaced primary access road

Minimum Operational Requirements to Cover All Categories

- Full record of waste volumes, types and source
- Separate cells for MSW, THW or HCW. Handling and management of these types of wastes should be in accordance with the provisions of the Joint Administrative Order (DENR-DOH) #02 and RA 6969
- Facility operation by a pool of fully-trained staff
- Aftercare, following site restoration and closure
- Prohibited access to wastepickers

Cost and Basic Design Features of the Different Categories of Final Disposal

Waste Disposal Category	Net Residual Disposal Rate	Estimated Area needed for 10 Years Operation	Approximate Investment Cost	Basic Features Considered
Category 1	Maximum Waste Disposal is 5 tpd	1.5 has.	PhP 7.5M	Soil liner with maximum permeability of 10^{-5} cm/sec thickness 0.60 m 10 cm thick sand layer and 100 mm perforated HDPE pipes for leachte collection 0.50 ha. Facilities area with 10 m^2 guardhouse and perimeter fence with 5-line barbed wire on concrete post leachate basin with pump for leachate recirculation Manholes with provision for flushing Leachate collection pipeline
	Maximum Waste Disposal is 10 tpd	2.5 has.	PhP 12M	
	Maximum Waste Disposal is 15 tpd	3.0 has.	PhP 16M	

Waste Disposal Category	Net Residual Disposal Rate	Estimated Area needed for 10 Years Operation	Approximate Investment Cost	Basic Features Considered
Category 2	Maximum Waste Disposal is 30 tpd	5.0 has.	PhP 30.0 M	Soil liner with maximum permeability of 10^{-6} cm/sec thickness of 0.75 m 15 cm thick sand layer with 30 cm thick gravel layer and 150 mm perforated HDPE pipes for leachate collection 1 ha. Facilities area with 15 m^2 gueadhouse and perimeter fence with 5-lines barbed on concrete post Leachate basin with pump for leachate recirculation Manholes with provision for flushing Leachate collection pipeline
	Maximum Waste Disposal is 50 tpd	6.5 has.	PhP 41 M	
	Maximum Waste Disposal is 75 tpd	7.5 has.	PhP 48.5 M	

Waste Disposal Category	Net Residual Disposal Rate	Estimated Area needed for 10 Years Operation	Approximate Investment Cost	Basic Features Considered
Category 3	Waste Disposal is more than 75 tpd up to 200 tpd	8.5 to 20 has.	PhP 60 M to 225 M	Soil liner with maximum permeability of 10^{-7} cm/sec Thickness of 1.0 m 15 cm thick sand layer with 30 cm thick gravel layer and 150 mm perforated HDPE pipes for leachate collection 2 ha. Facilities area with 15 m^2 guardhouse and perimeter fence with 5-lines barbed on concrete post leachate basin with pump for leachate recirculation Manholes with provision for flushing Leachate collection pipeline

Disposal Category	Net Residual Disposal Rate	Estimated Area needed for 10 Years Operation	Approximate Investment Cost	Basic Features Considered
Category 4	Waste Disposal more than 200 tpd	> 20 has	PhP 225 M plus	Composite liner consisting of 1.5 mm HDPE liner with 0.60 thick soil liner maximum permeability of 10^{-7} m/sec 15 cm thick sand layer with 30 cm thick gravel layer and 150 mm perforated HDPE pipes for leachate collection 3 has. Facilities area with 15 m^2 guardhouse and perimeter fence with 5-lines barbed on concrete post Leachate basin with pump for leachate recirculation Manholes with provision for flushing Leachate collection pipeline