

CE 443: Environmental Engineering III

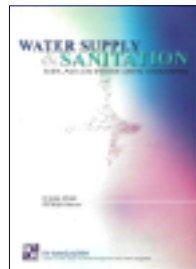
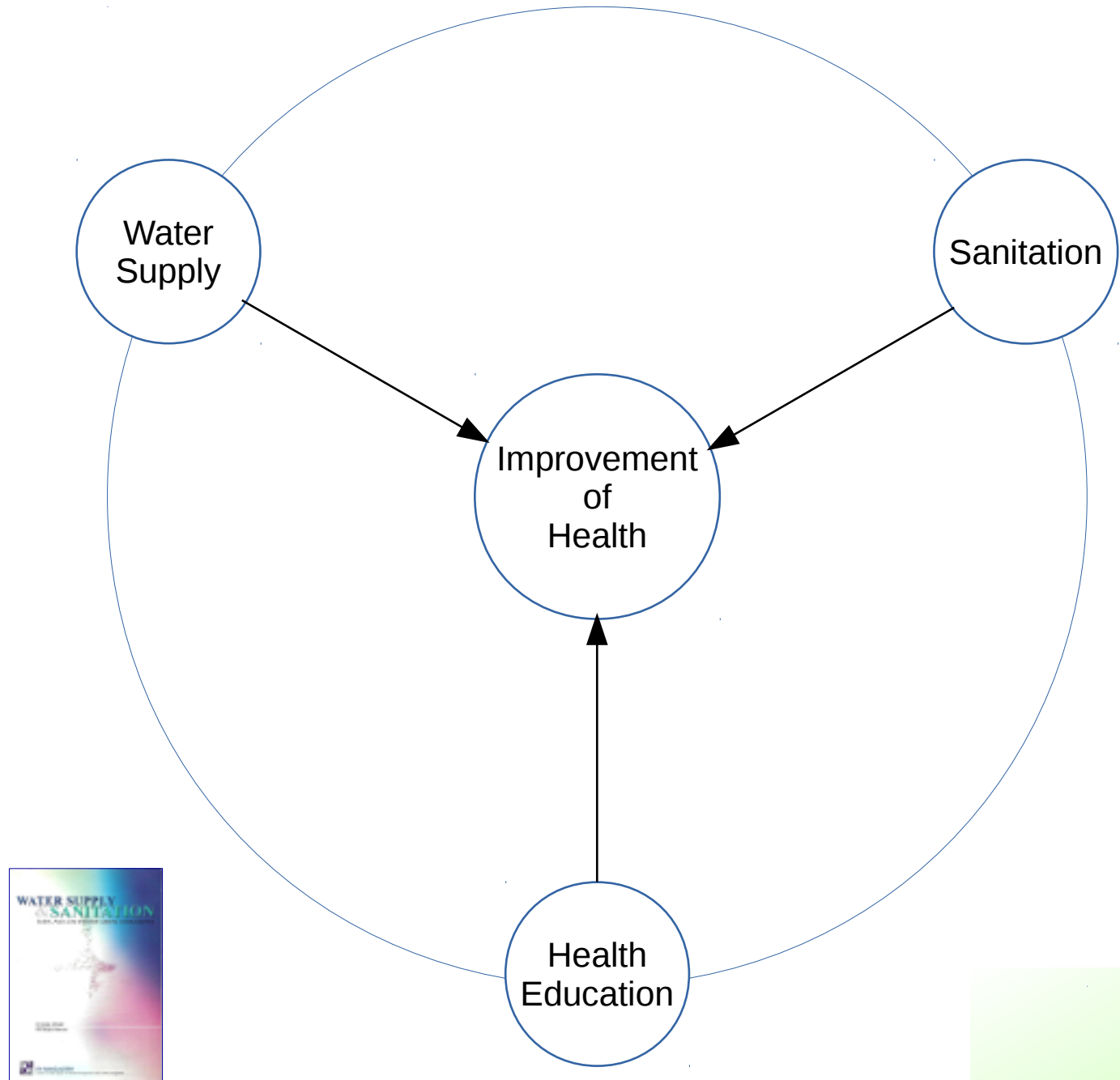
Module 01

Contents:

Sanitation and health; Low cost sanitation technology - on-site sanitation systems for rural communities;

Sanitation and Health

Sanitation refers to public health conditions related to clean drinking water and adequate treatment and disposal of human excreta and sewage. Preventing human contact with feces is part of sanitation, as is hand washing with soap. Sanitation systems aim to protect human health by providing a clean environment that will stop the transmission of disease, especially through the fecal-oral route. [Wikipedia]

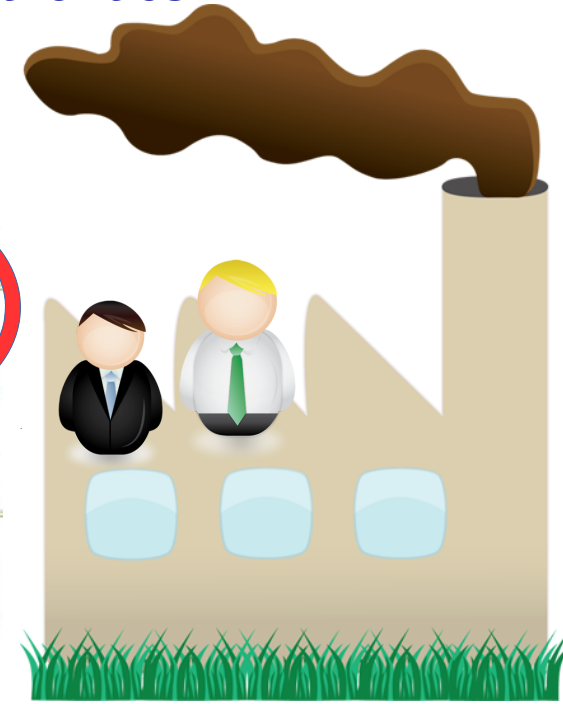
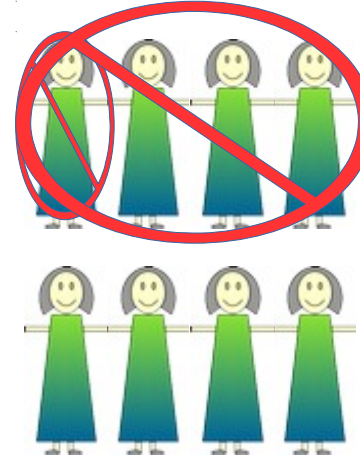


Why and how the health engineering projects are undertaken by authorities?

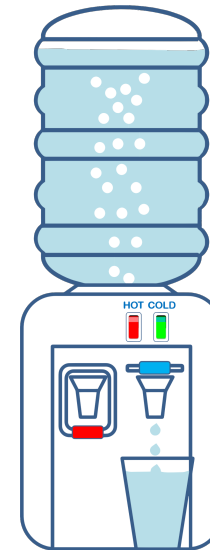
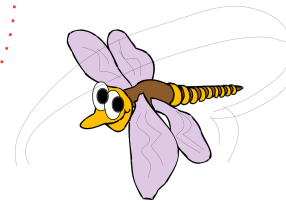
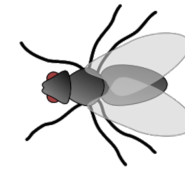
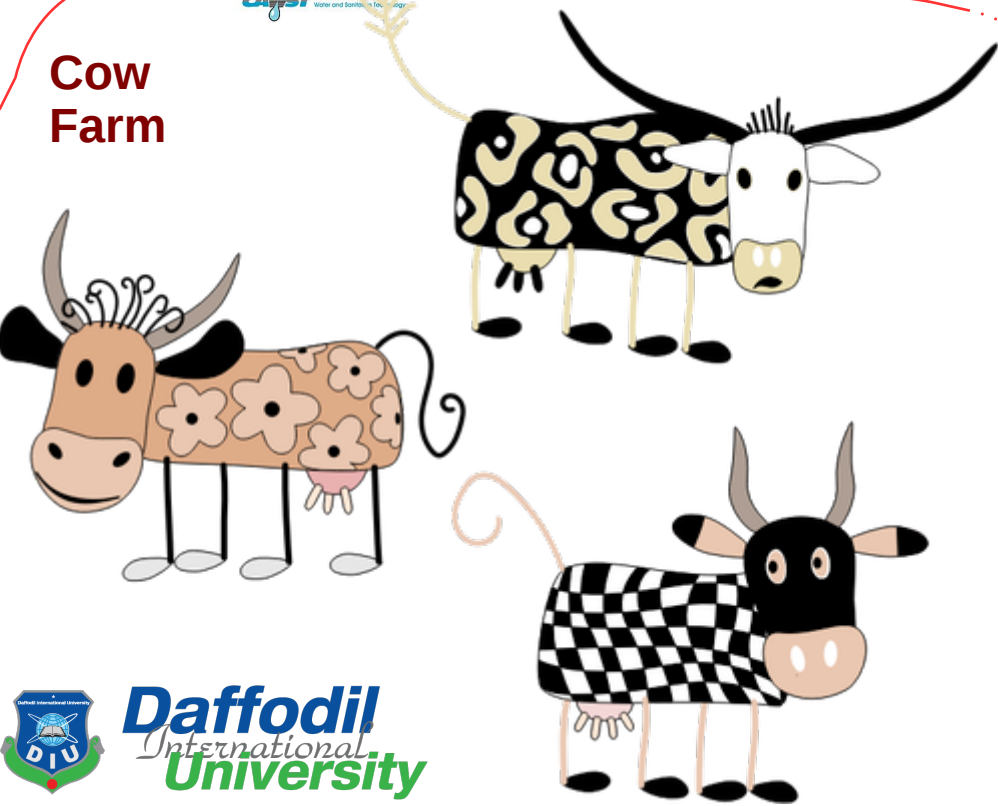
**Industry
Factory**

**STOP MICROBES
USE GOOD HYGIENE**

CASTI Centre for Advanced Water and Sanitation Technology September 2012



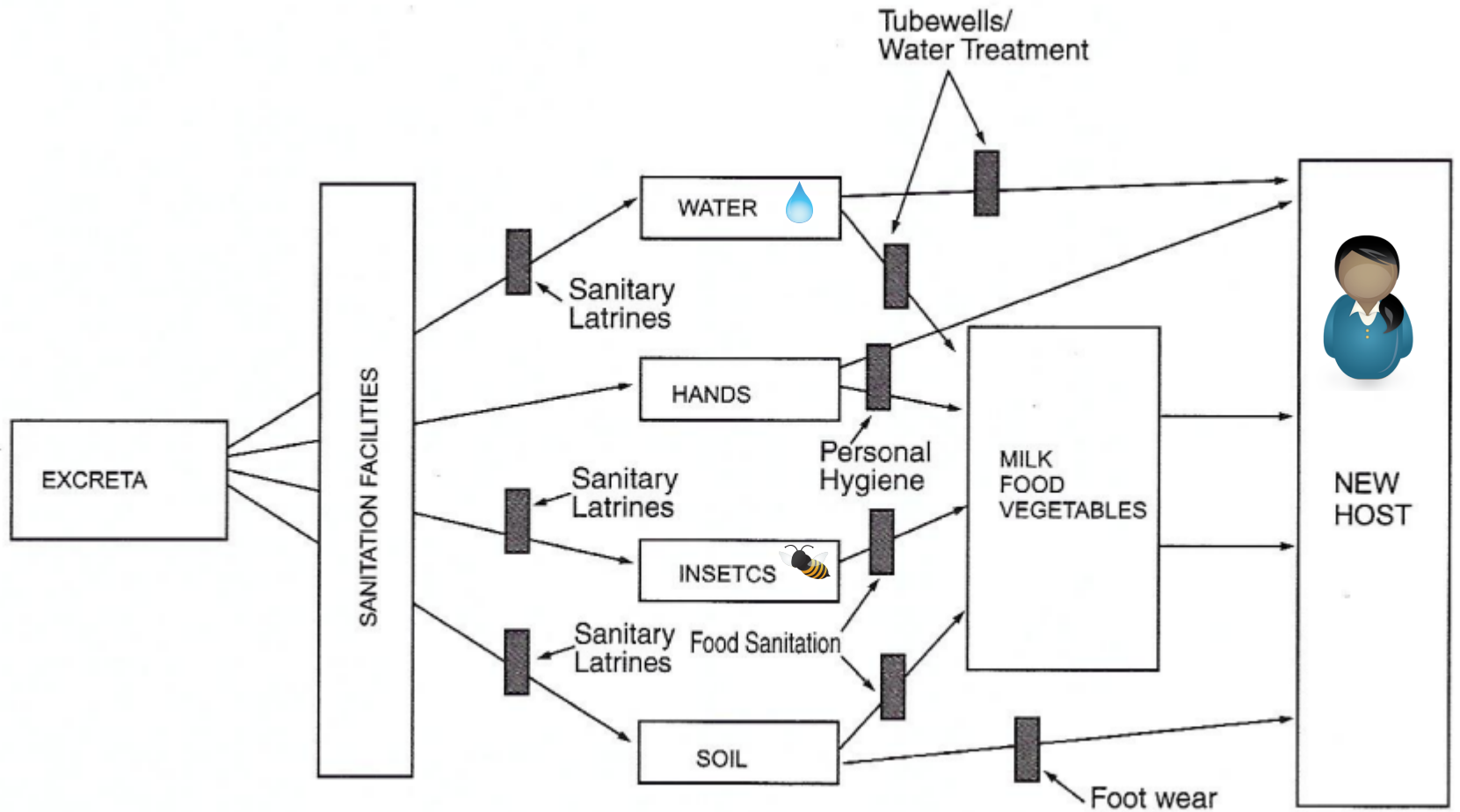
**Cow
Farm**



Sanitation and Health: Diseases transmission



Page 101



Three key properties of pathogens:
 Latency
 Persistence
 Multiplication
 (Page 98)

Sanitation: what dose it mean

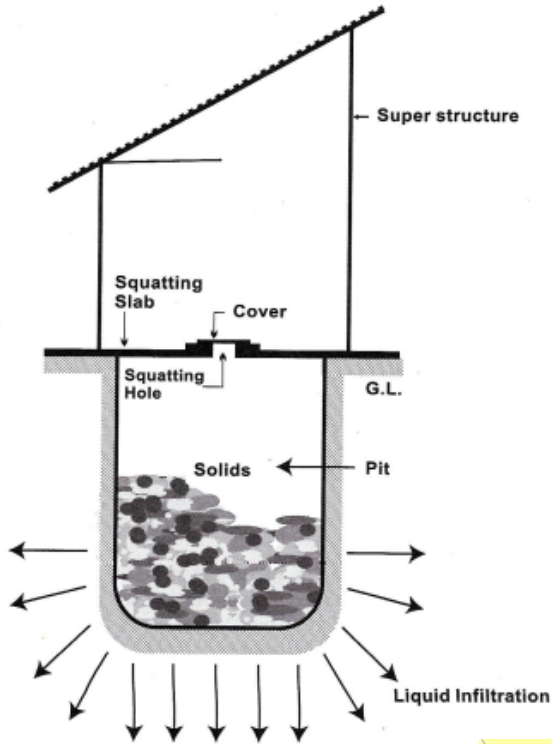
Is that a sanitary toilet?



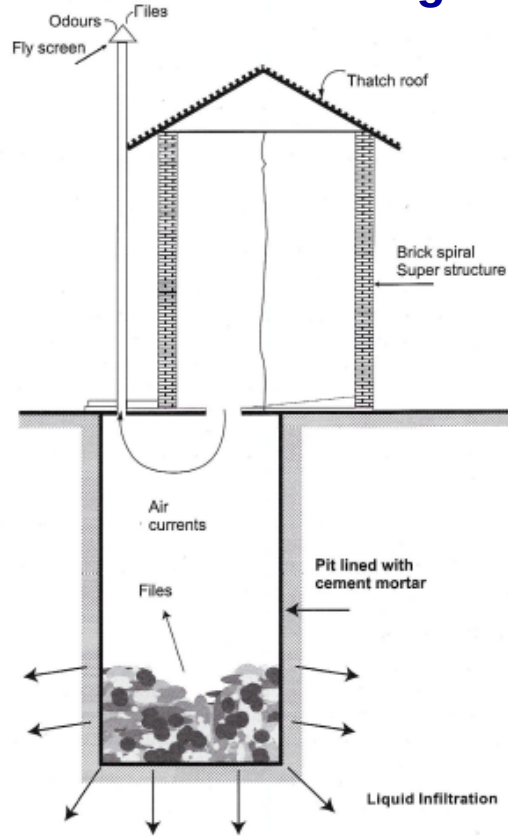
Sanitation: Different types of toilet technologies



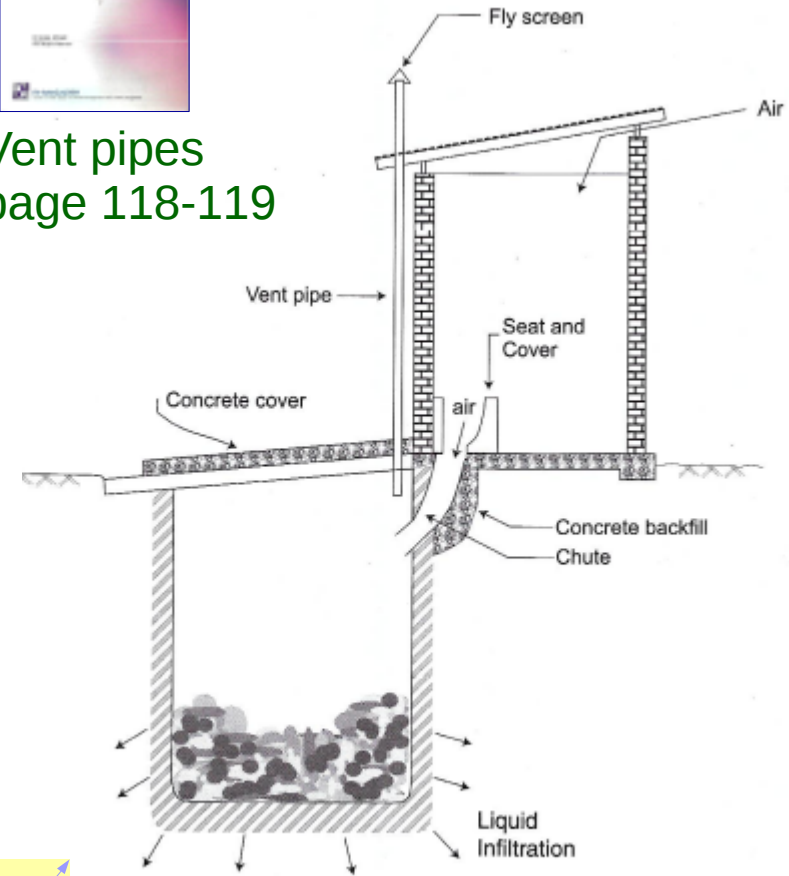
Vent pipes
page 118-119



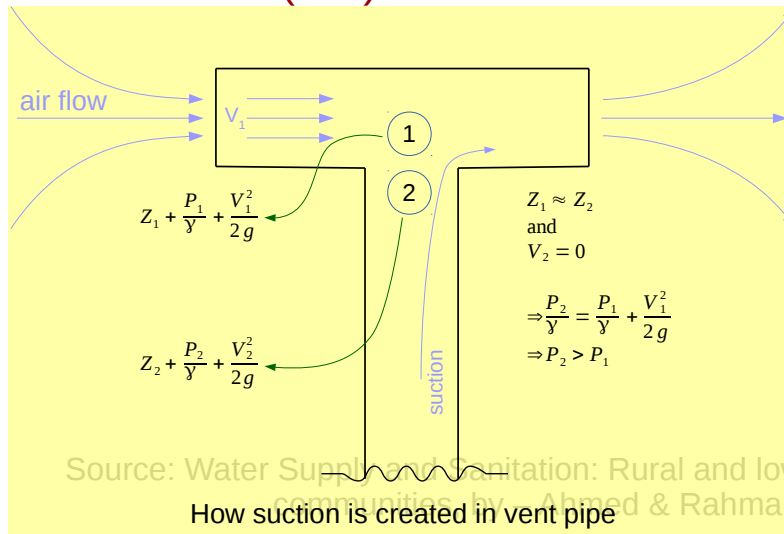
Simple Pit latrine



Ventilated Improved Pit (VIP) latrine

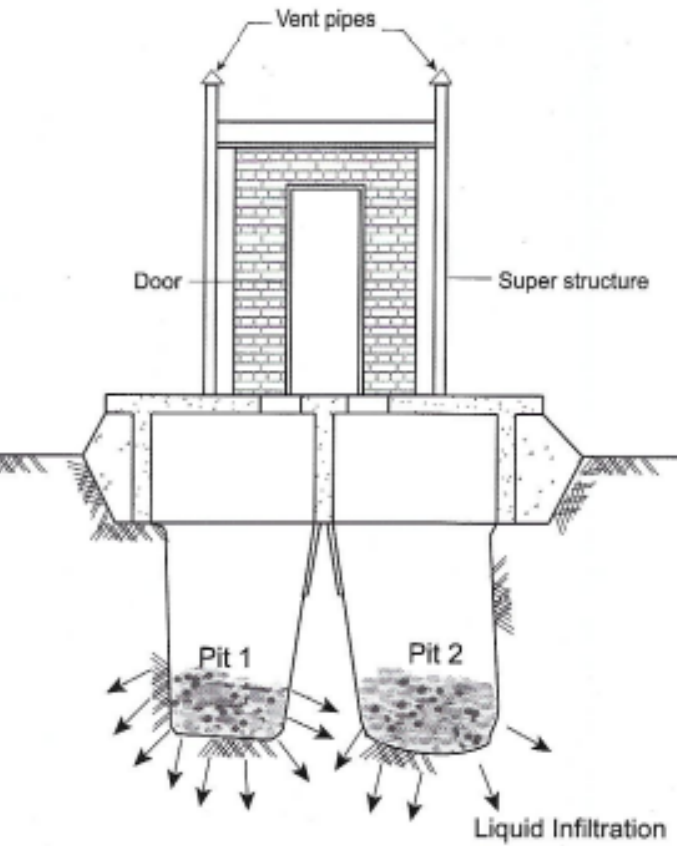


Reed Odourless Earth Closet (ROEC)

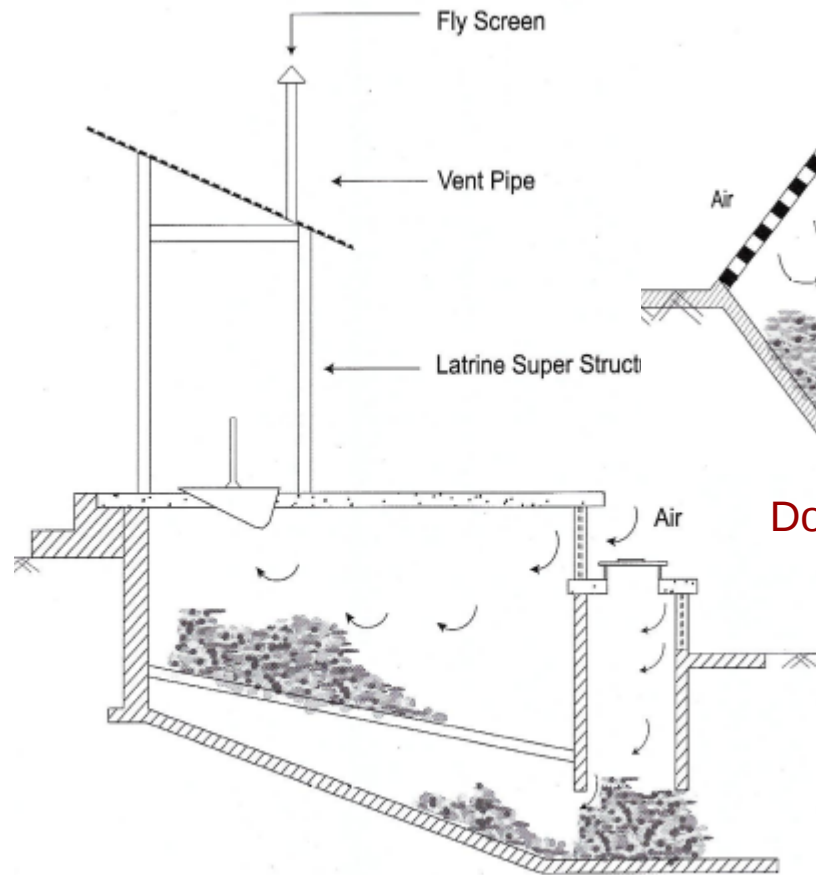


Source: Water Supply and Sanitation: Rural and low income urban communities by Ahmed & Rahman
How suction is created in vent pipe

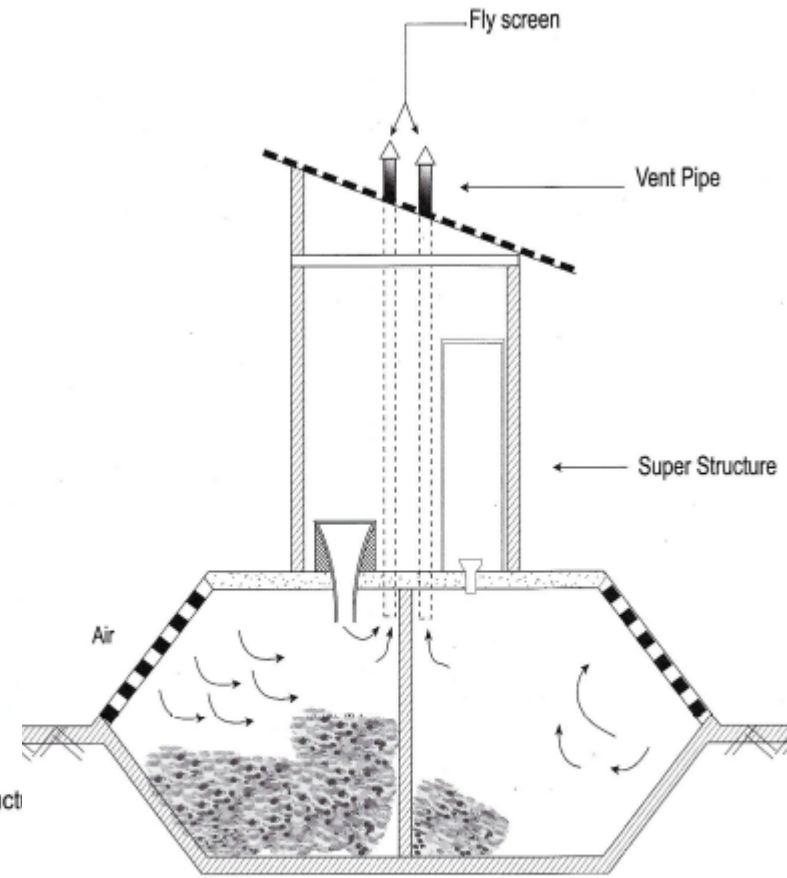
Sanitation: Different types of toilet technologies



Alternating twin-pit VIP latrine

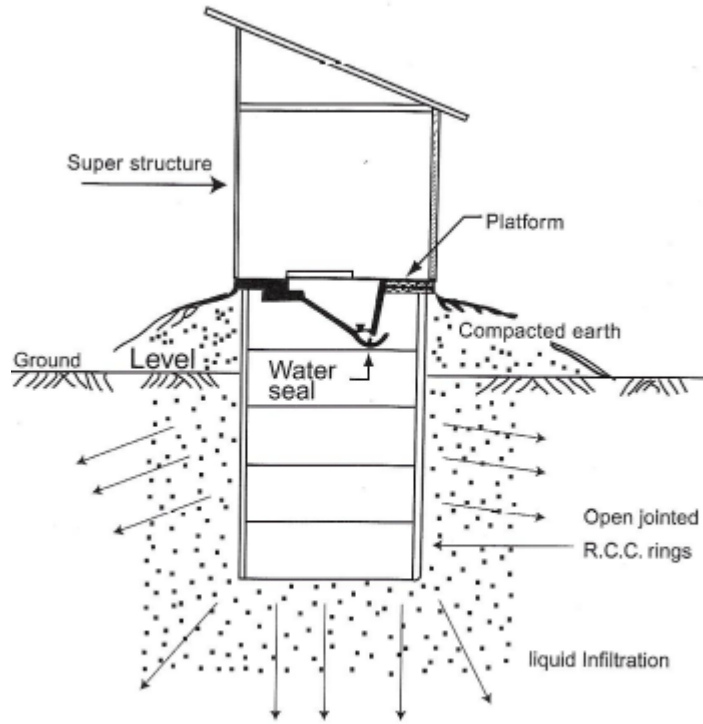


Continuous compost latrine

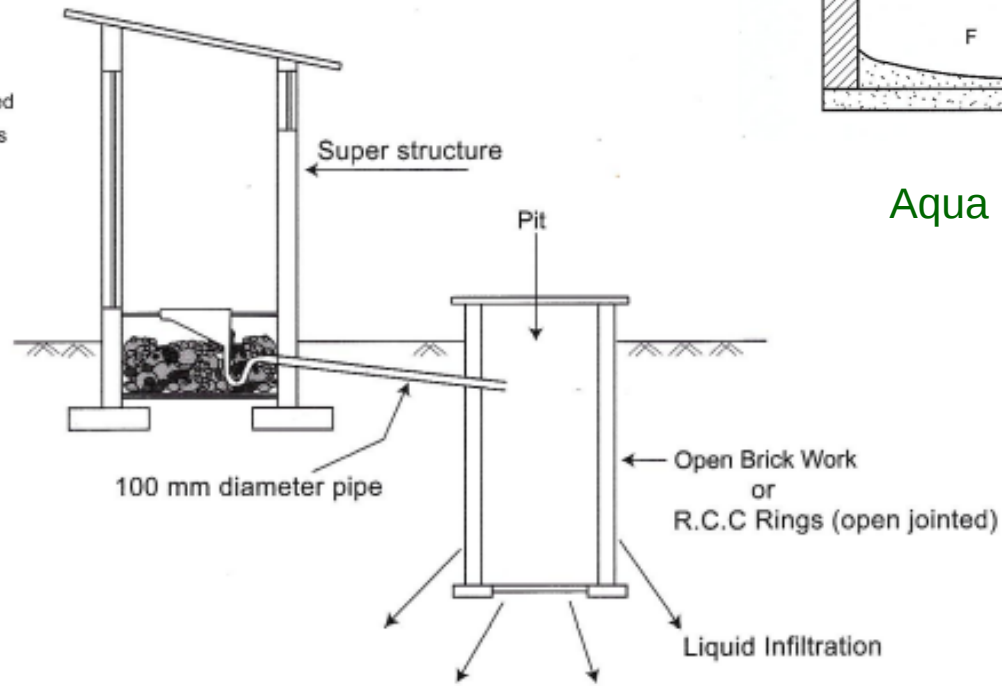


Double vault compost latrine

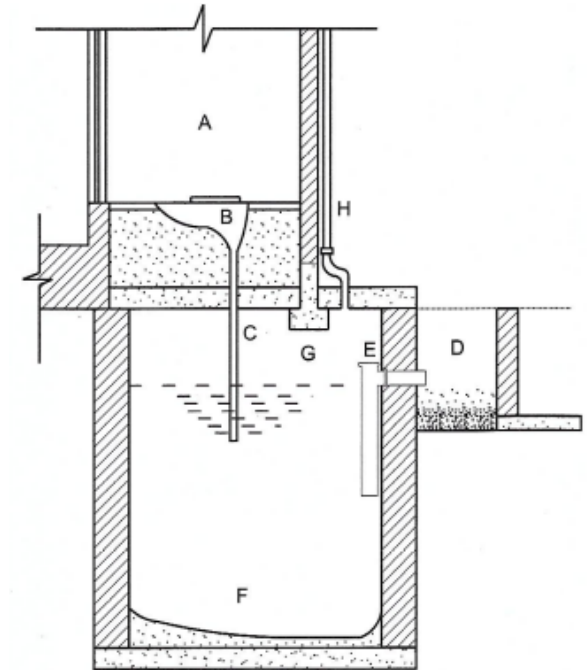
Sanitation: Different types of toilet technologies



The direct pit pour-flush latrine

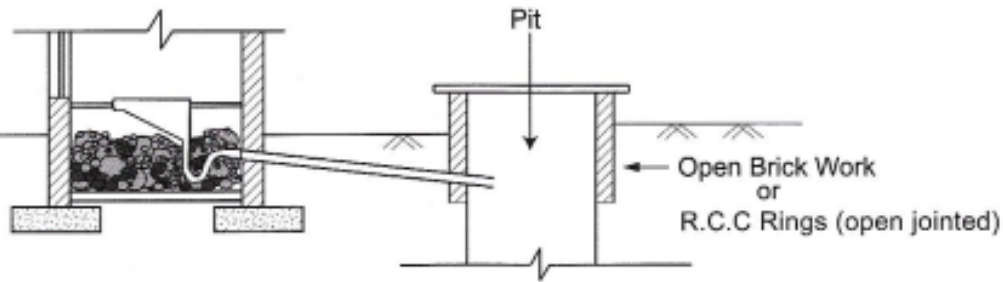


Single off-set pour-flush latrine

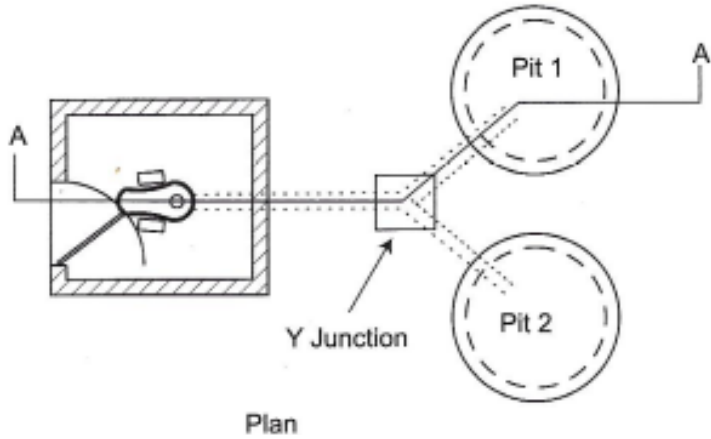


Aqua privy

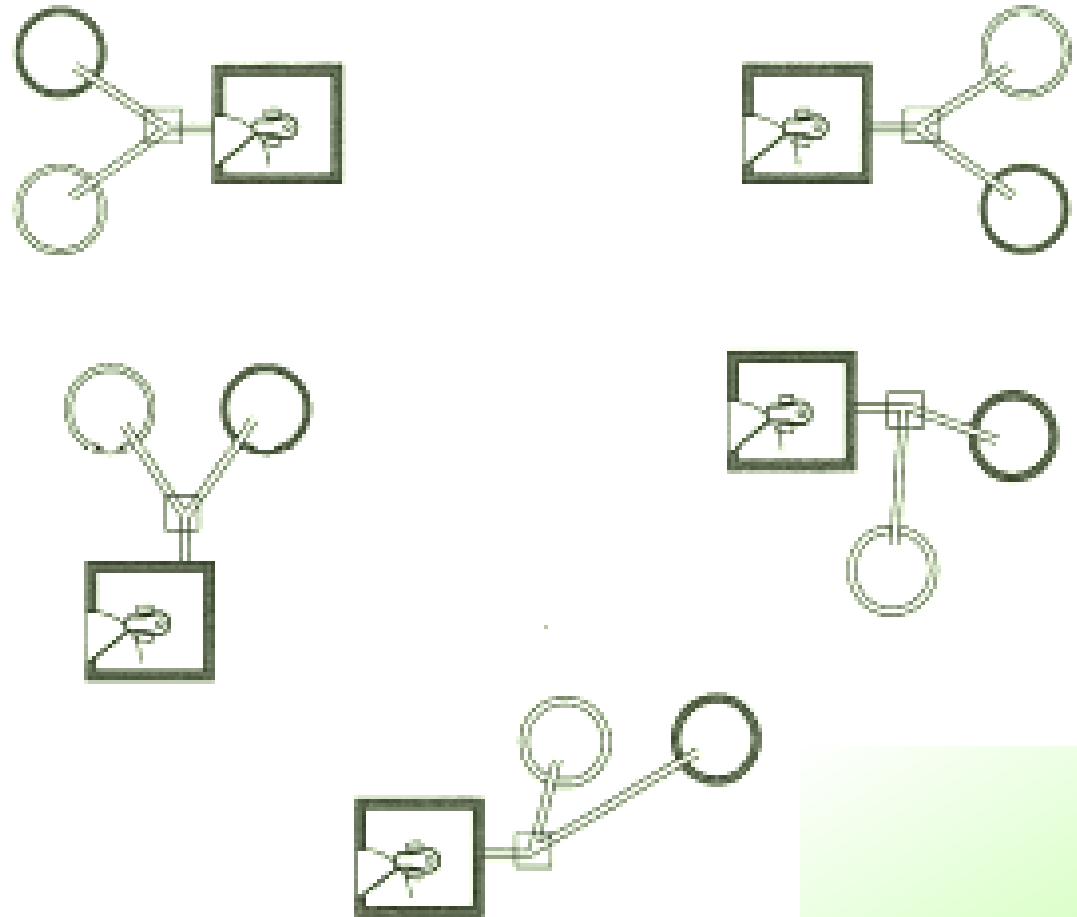
Sanitation: Different types of toilet technologies



Section A-A

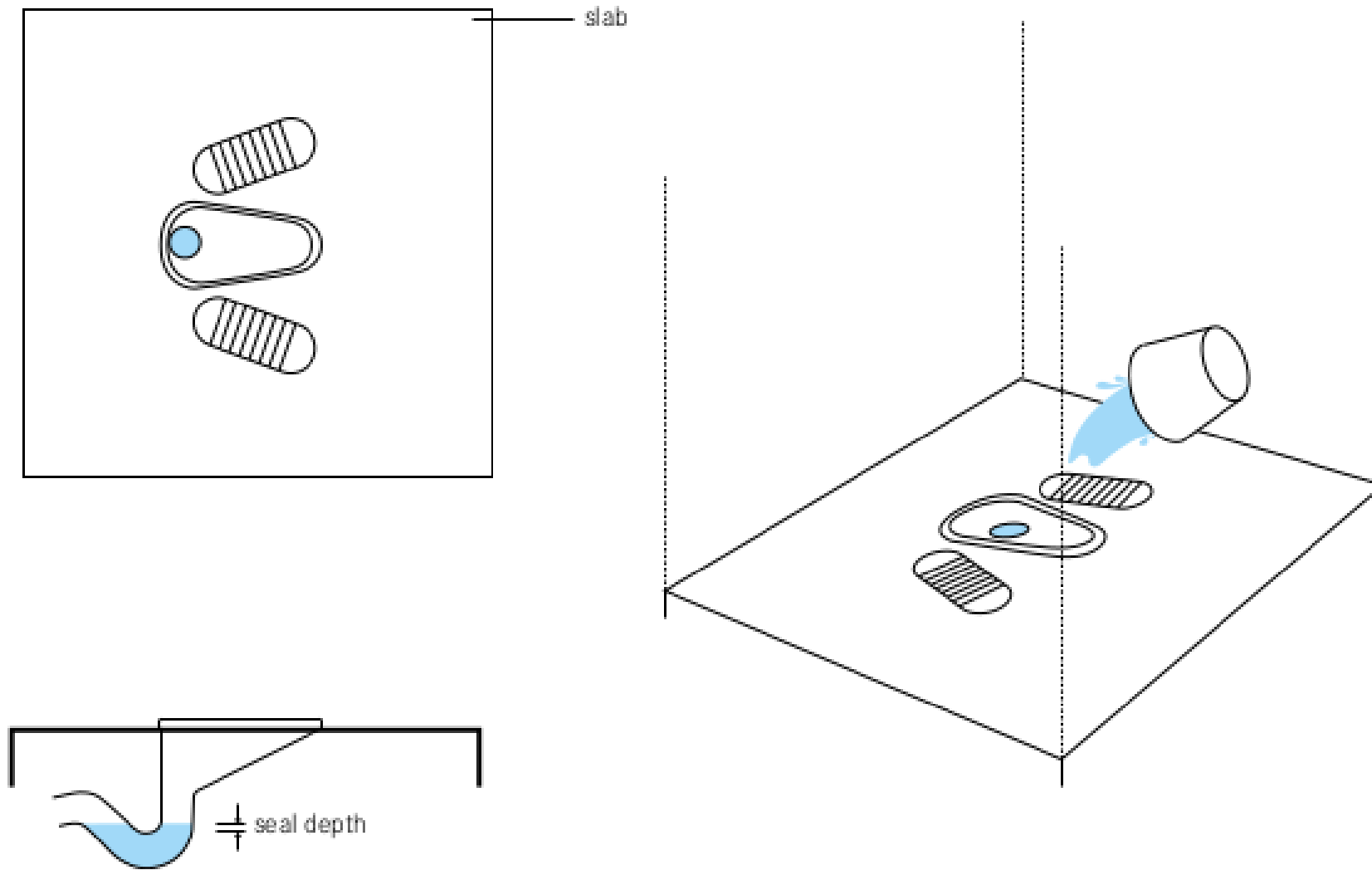


Plan



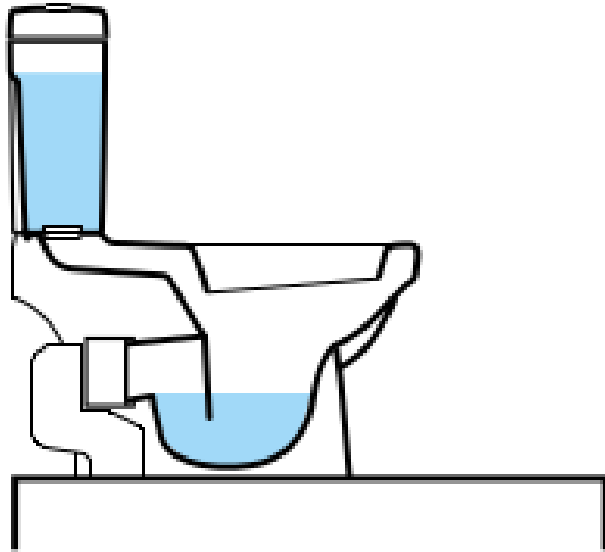
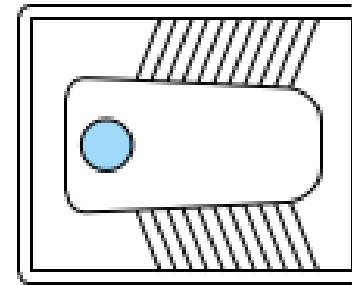
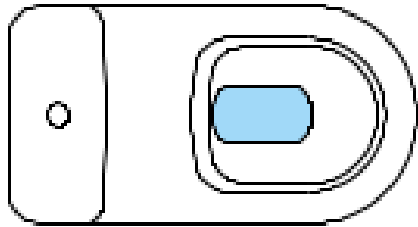
Alternative twin off-set pour-flush latrine

Sanitation: Different types of toilet technologies

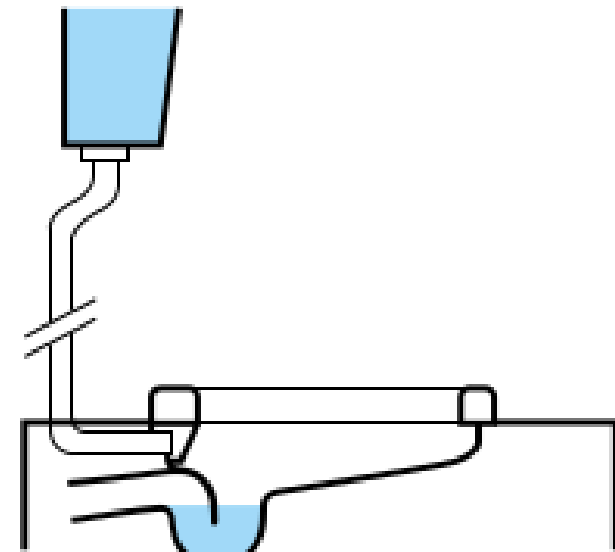


Pour Flush Toilet

Sanitation: Different types of toilet technologies



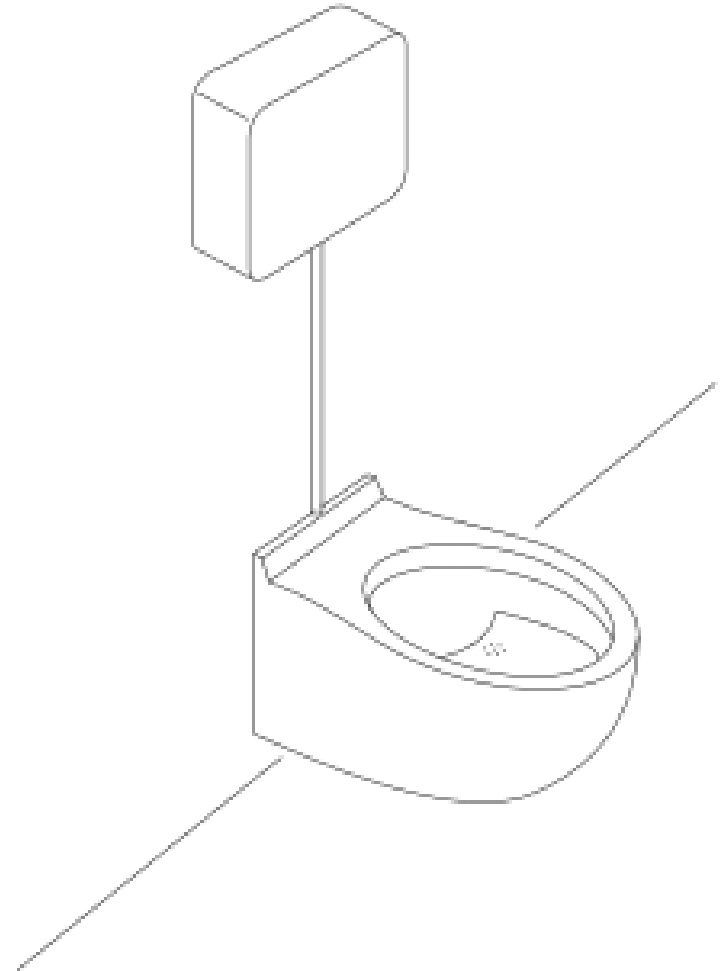
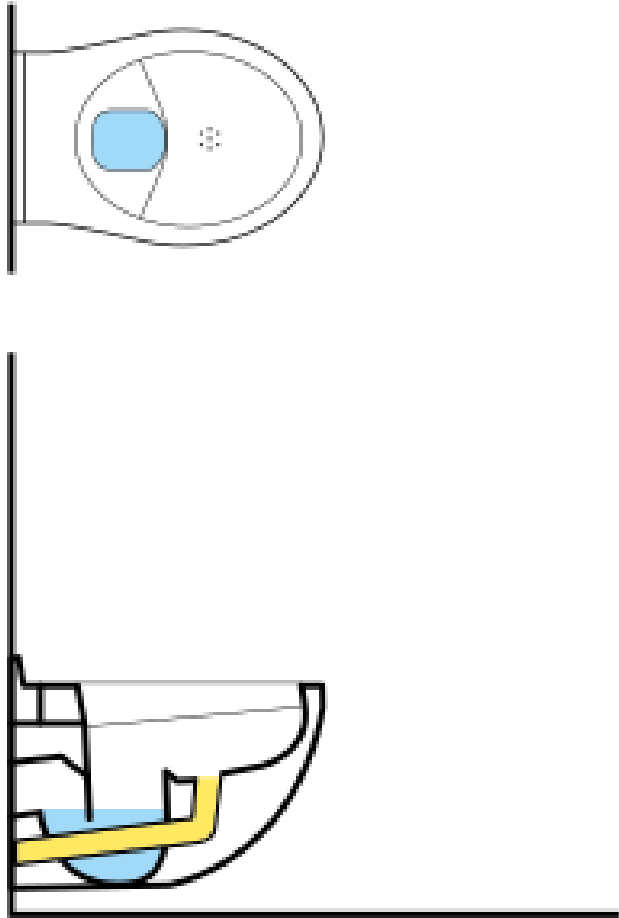
option 1



option 2

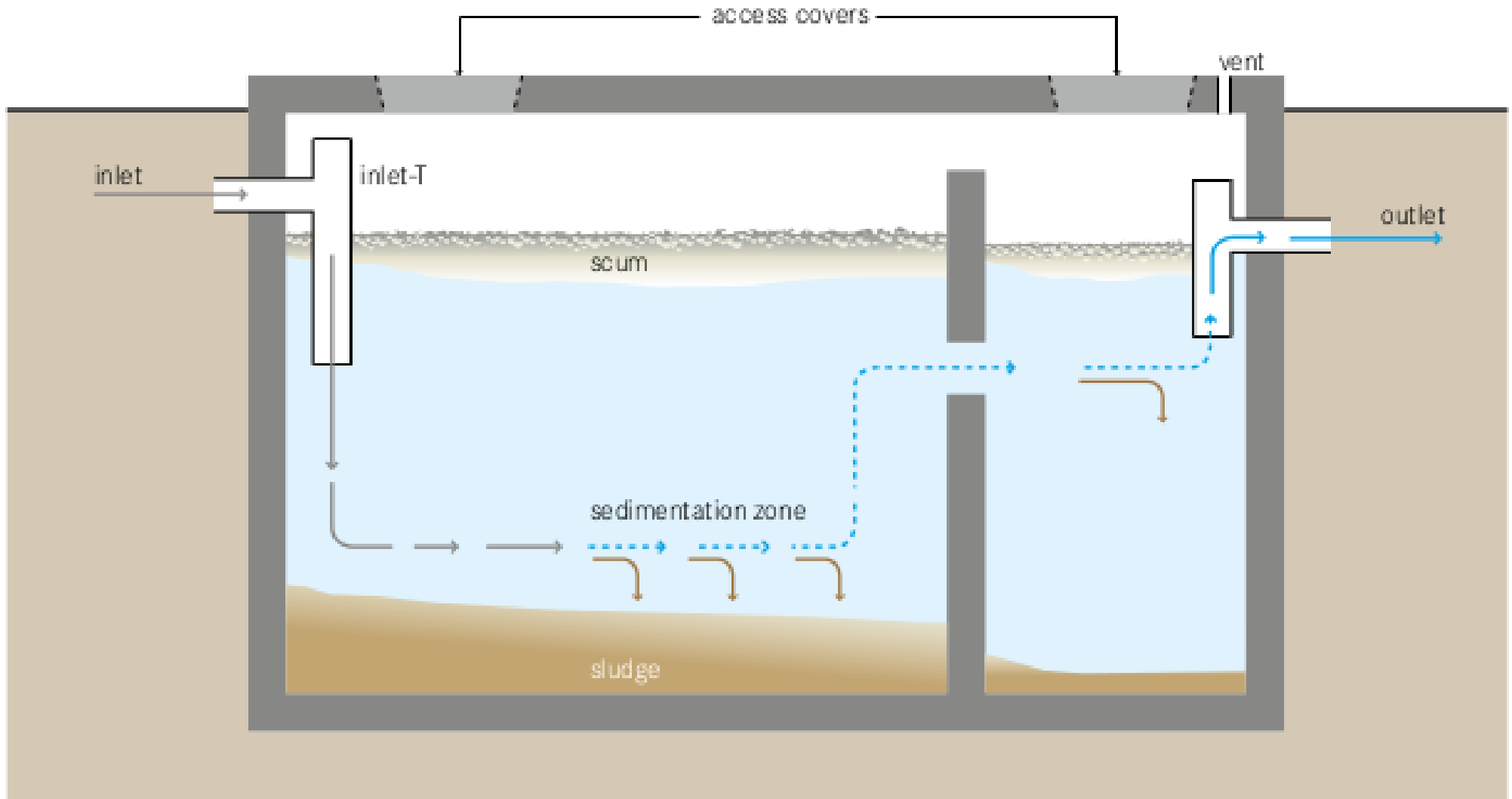
Cistern Flush Toilet

Sanitation: Different types of toilet technologies



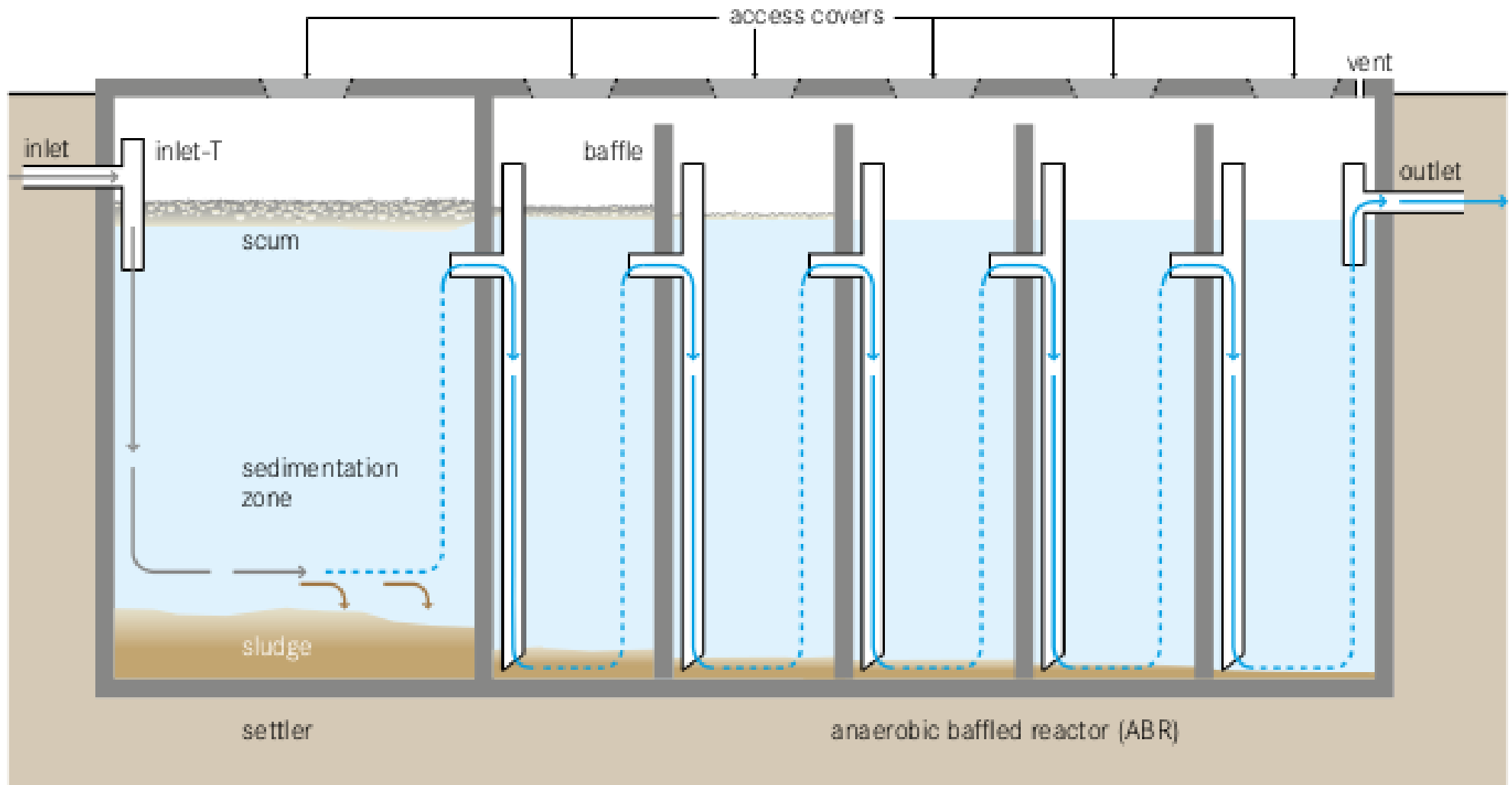
Urine diverting Toilet

Sanitation: Different types of toilet technologies



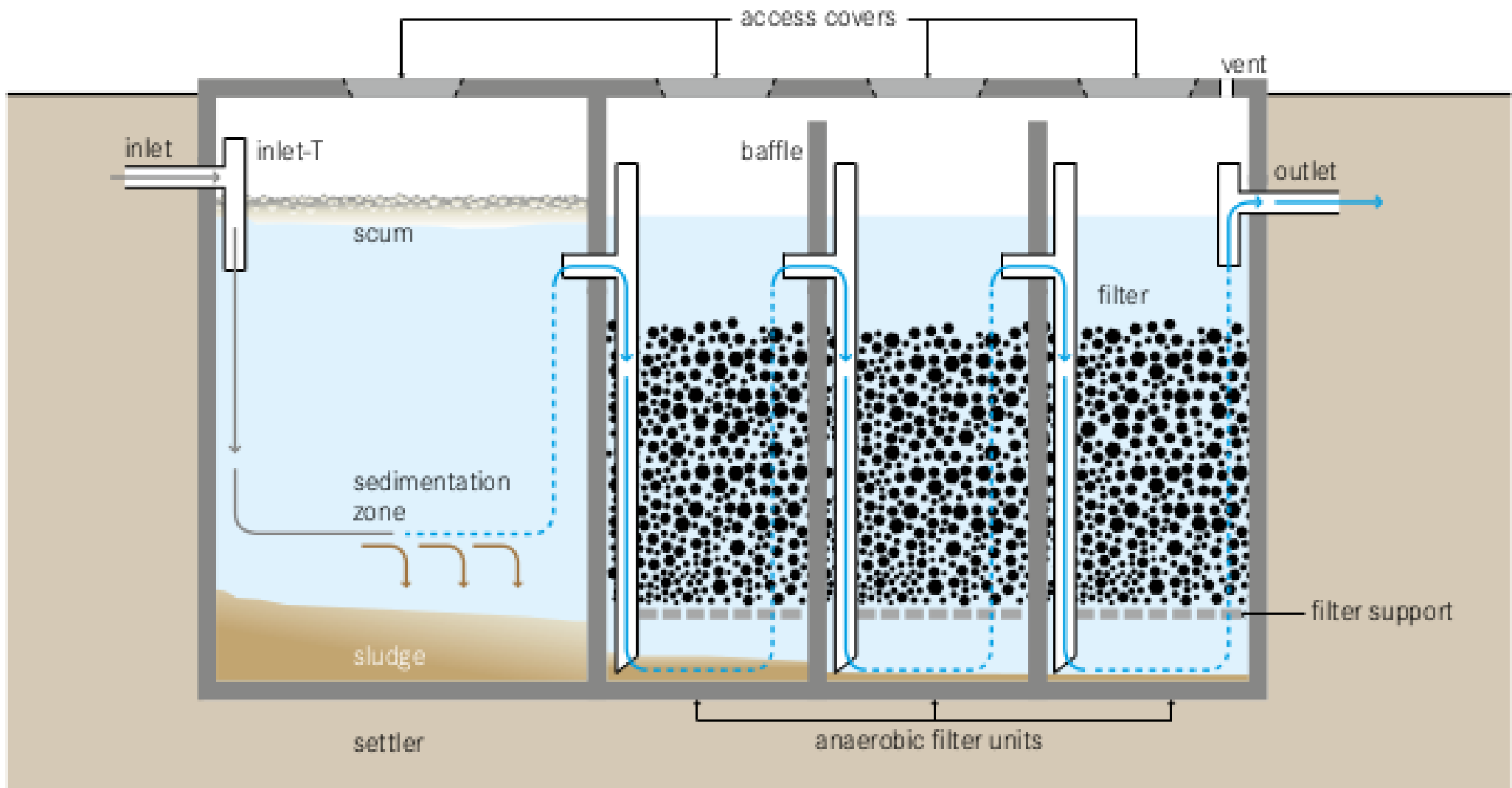
Septic Tank

Sanitation: Different types of toilet technologies



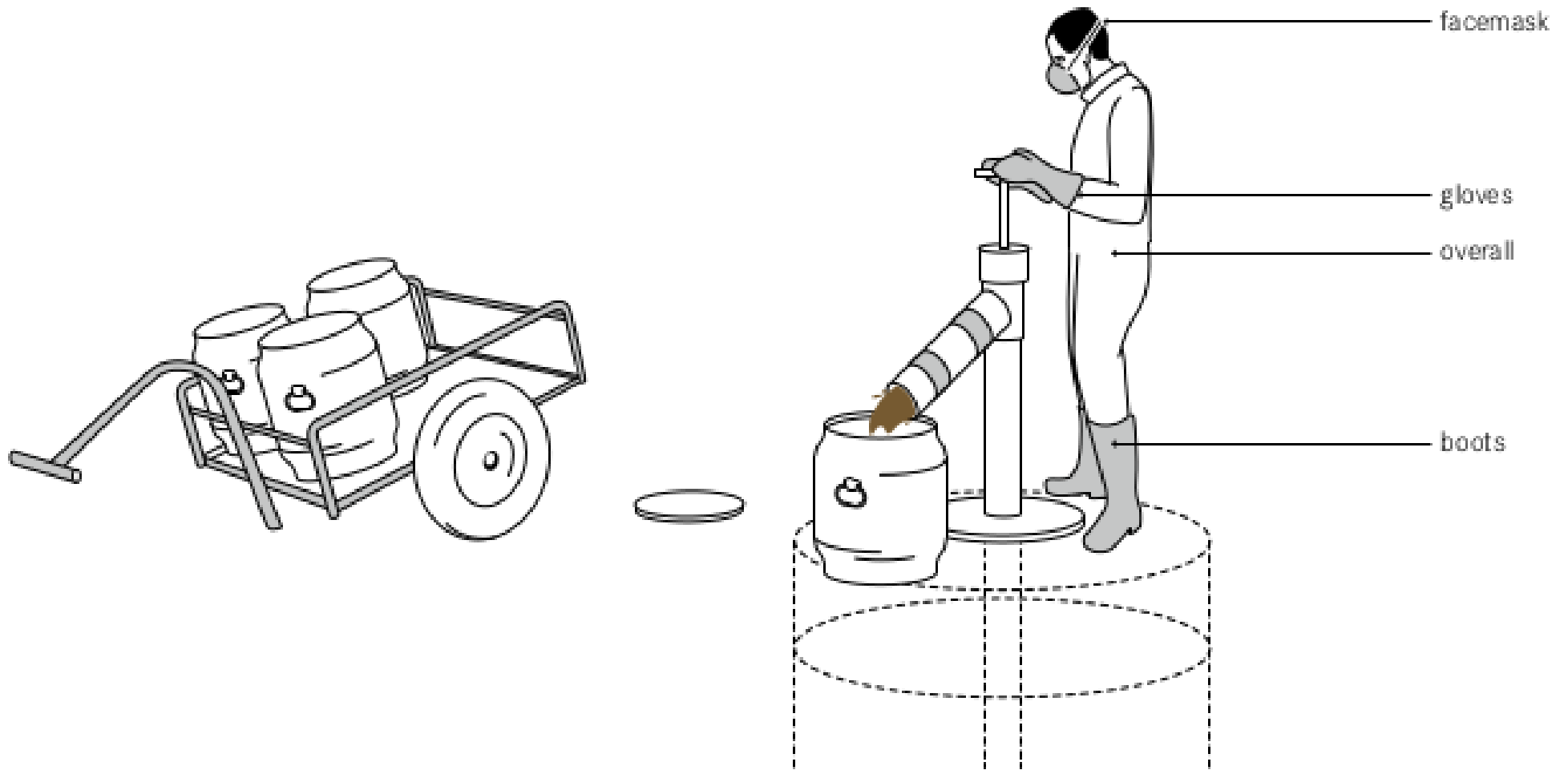
Anaerobic baffled reactor (ABR)

Sanitation: Different types of toilet technologies



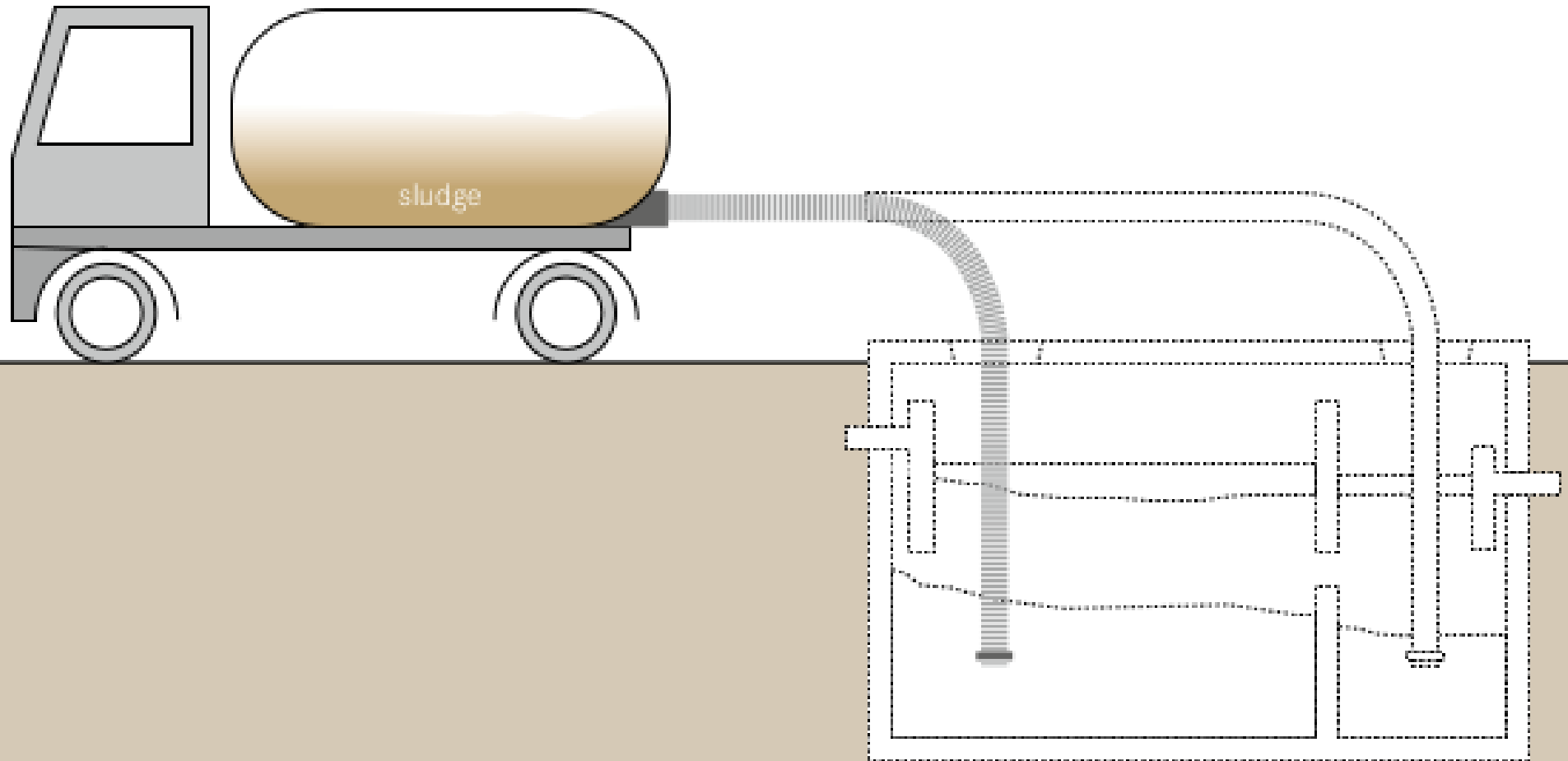
Anaerobic Filter

Sanitation: Different types of toilet technologies



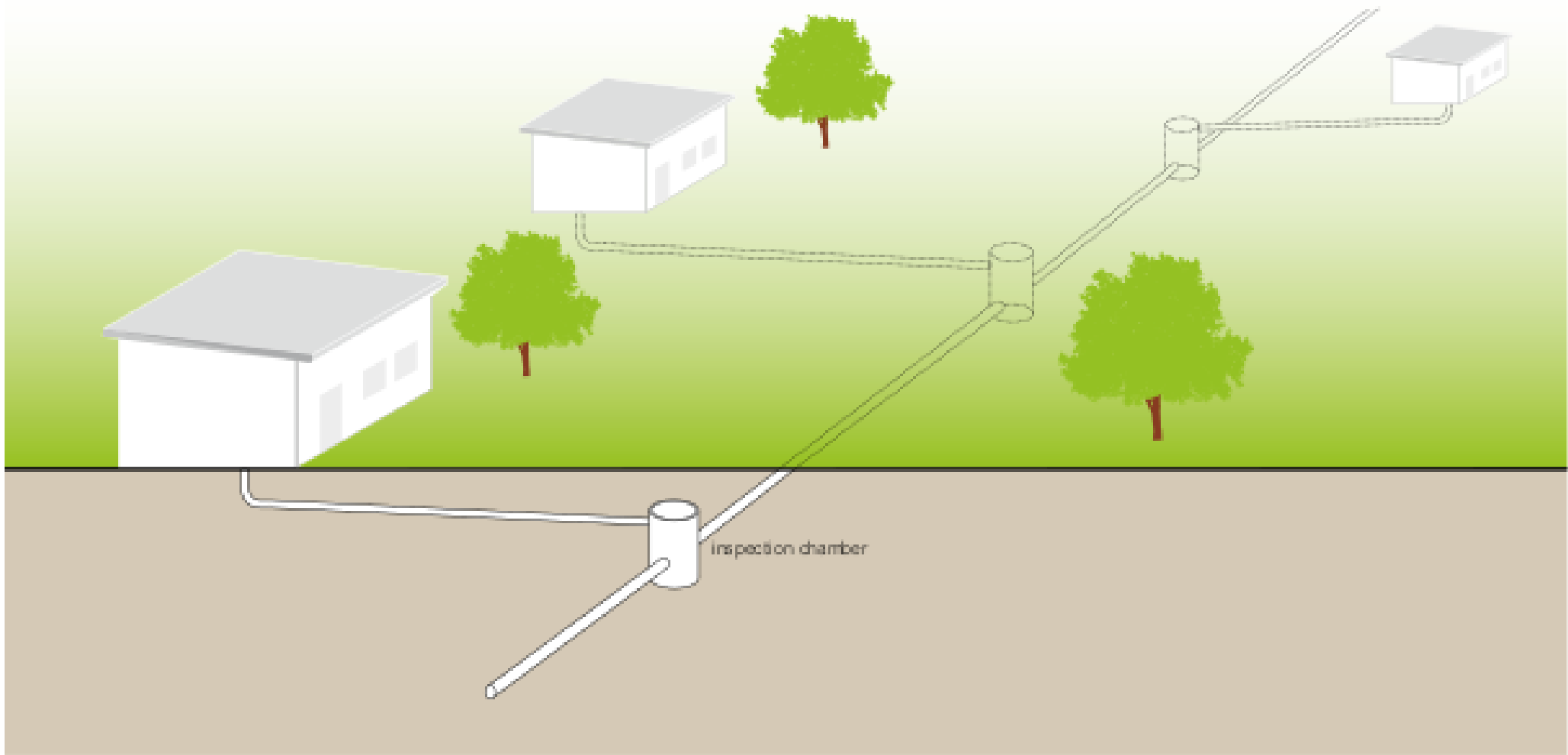
Sludge removing (Manual)

Sanitation: Different types of toilet technologies



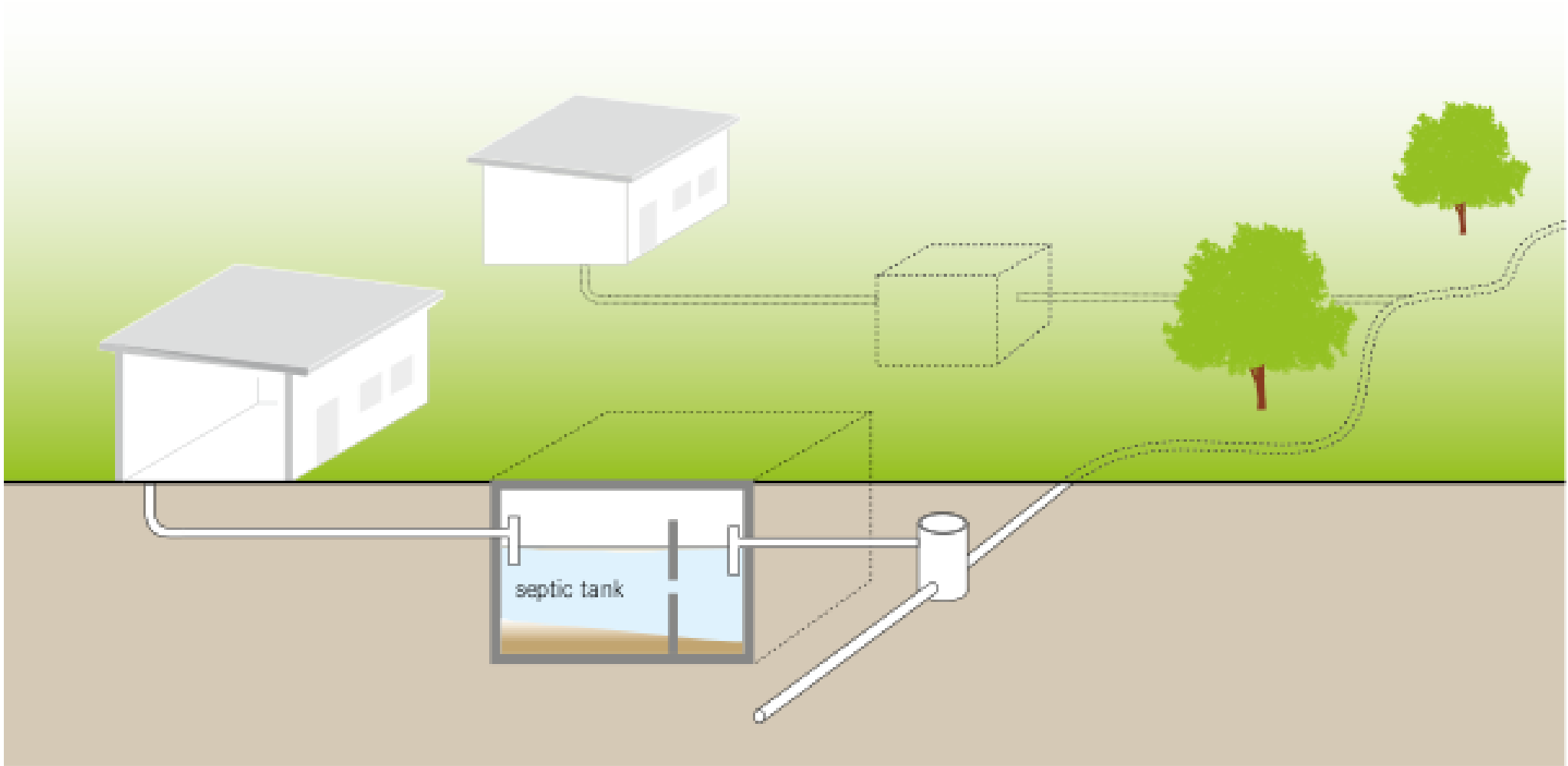
Sludge removing (Motorized)

Sanitation: Different types of toilet technologies



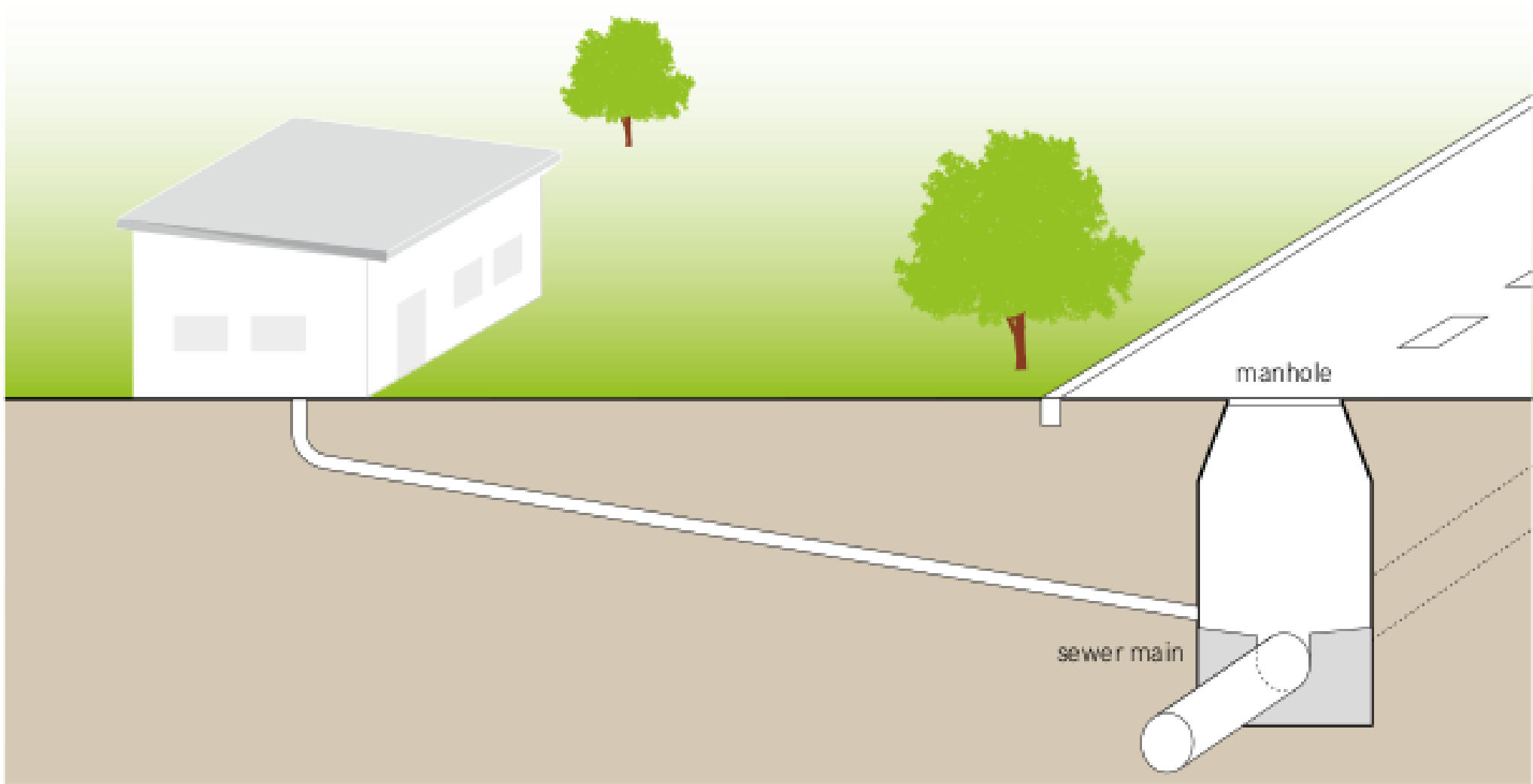
Simplified sewer

Sanitation: Different types of toilet technologies



Solids free sewer

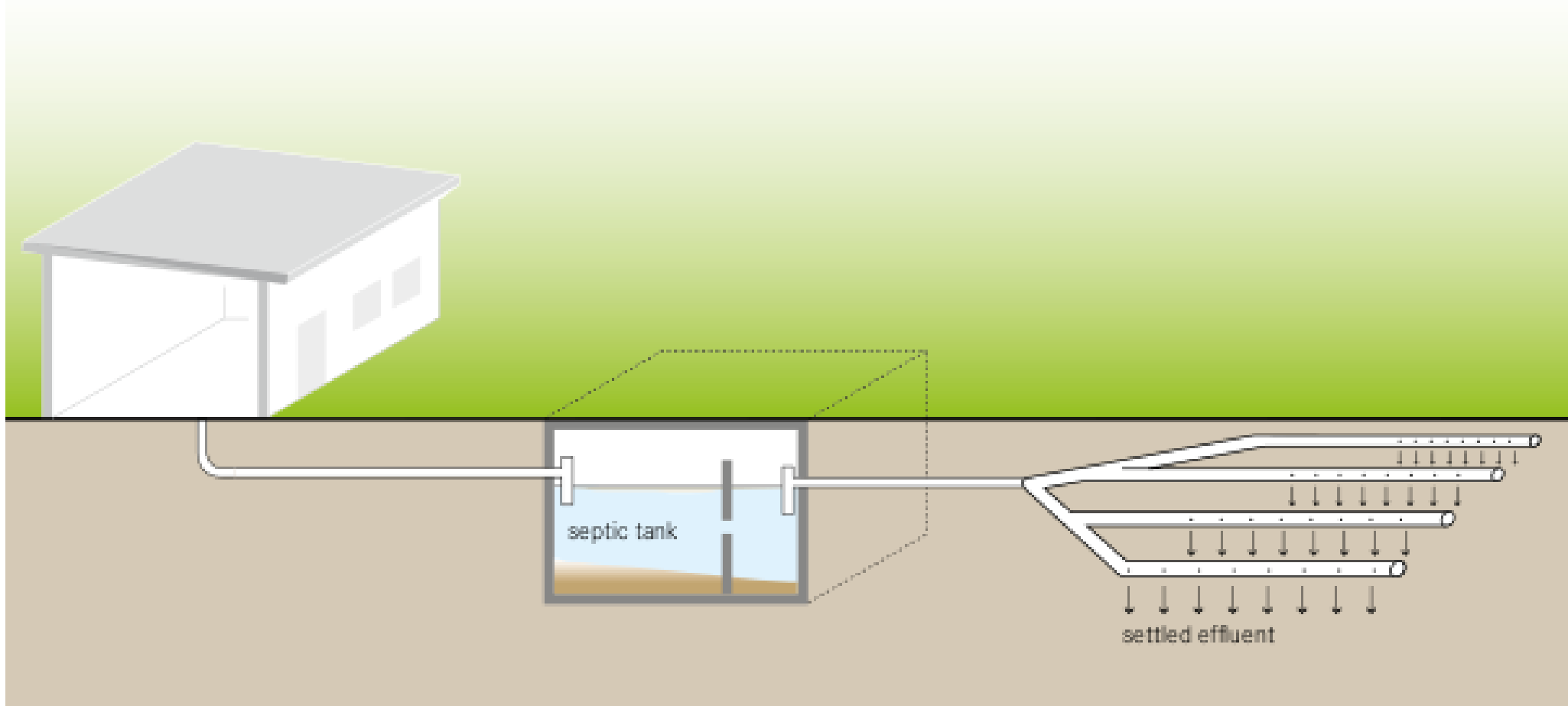
Sanitation: Different types of toilet technologies



Conventional gravity sewer

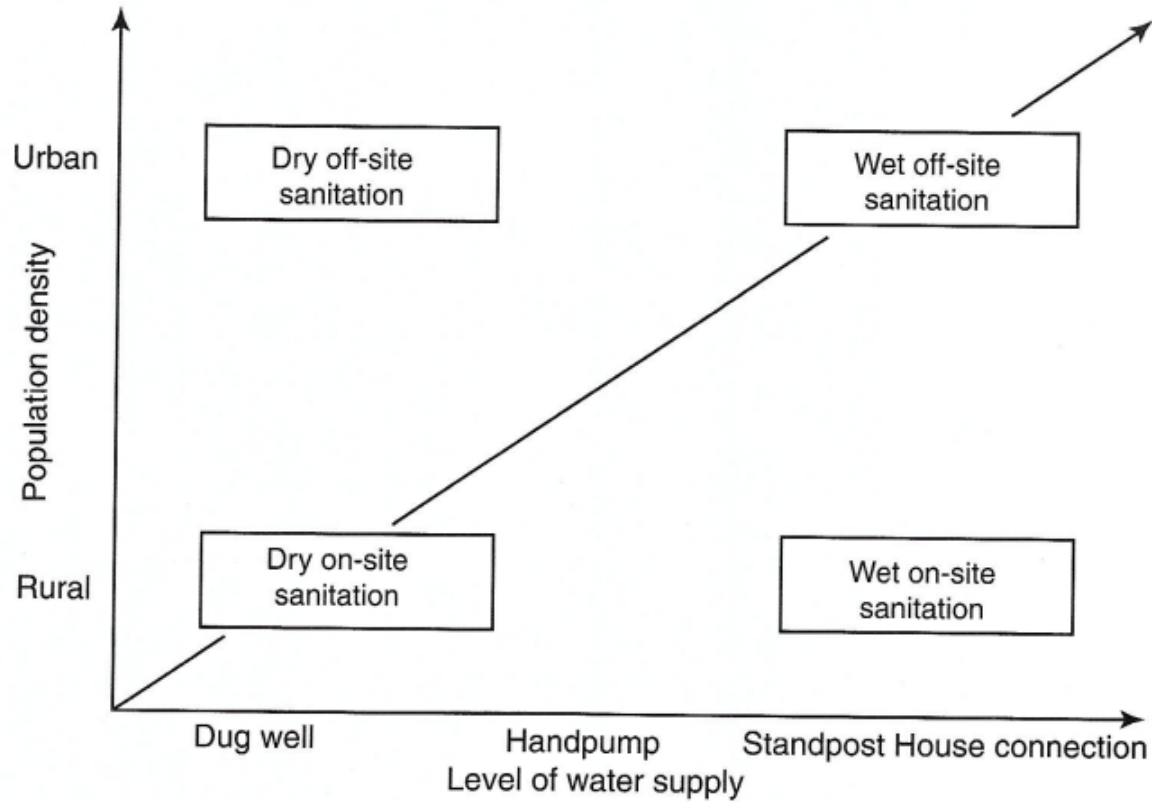
Sanitation: Different types of toilet technologies

Related topic: Absorption Trench



Leach field

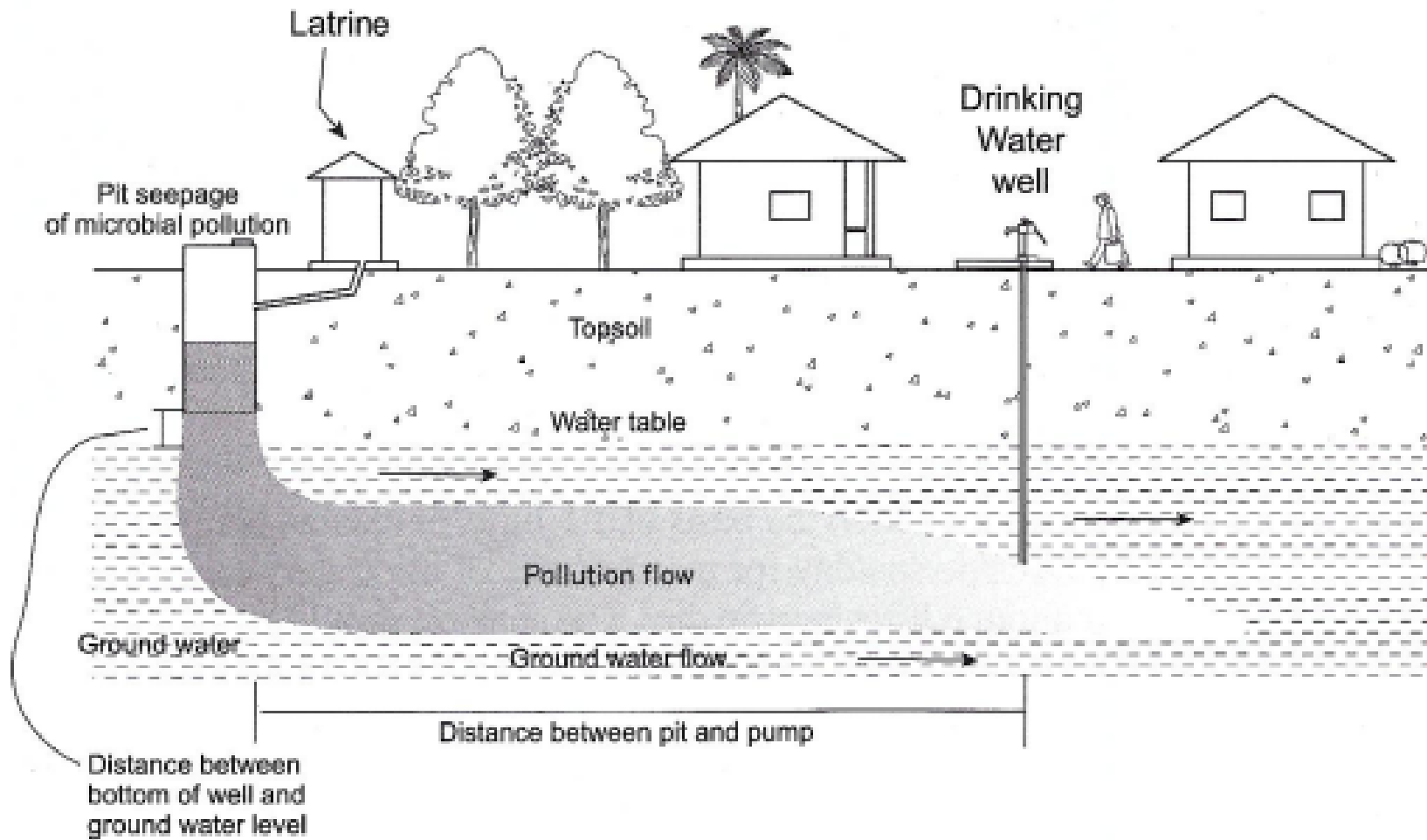
Sanitation: Classification of sanitation technologies



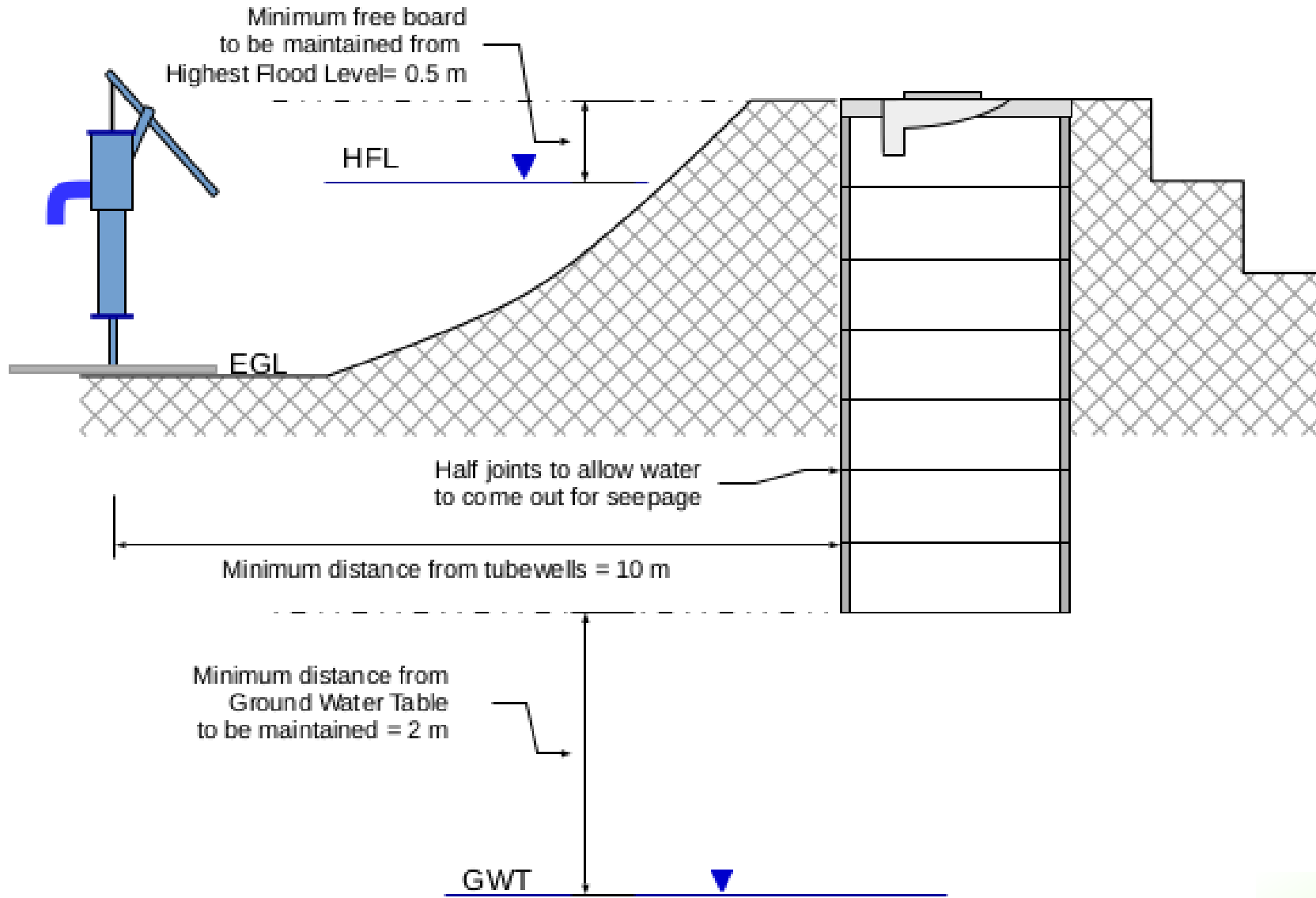
	Dry	Wet
Off-site	Bucket latrine	Sewerage system SBS system
On-site	Simple pit latrine VIP latrine ROEC Compost latrine	Pour flush pit latrine Aqua privy Twin-pit pour flush latrine Septic tank

Figure 8.3 Various sanitation systems based on water consumption level and population density (Source: Veenstra et al., 1997)

Sanitation: Environmental considerations



Sanitation: Environmental considerations



Sanitation: Mathematical examples

