Wastewater Engineering

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Introduction

Learning Outcomes

Describe basic concept of microbiology and wastewater characteristics, sewer system and able to explain the concept of wastewater treatment and sludge treatment system

Solve some of wastewater parameters, i.e. solids, BOD and COD, and the wastewater quantity

Apply the knowledge to design of each unit process in sewage treatment plant, able to differentiate between processes

Produce report or presentation related to current environmental issues

Civil Engineer

Construction

Structure

Hydraulics & Hydrology

Geotechnics

Highway & Transportation

Environmental Engineering

Environmental Engineering

Water Treatment and Supply

Domestic Wastewater Treatment

Air Pollution Control

Solid Waste Management

Industrial and Hazardous Waste Management

Water Quality Management

Environmental Management

Role of Civil-Environmental Engineer

Wastewater Treatment System

Planning

Evaluation

Design

Construction

Operation and maintenance

What is Wastewater?

Used water from residential, commercial, and industrial areas

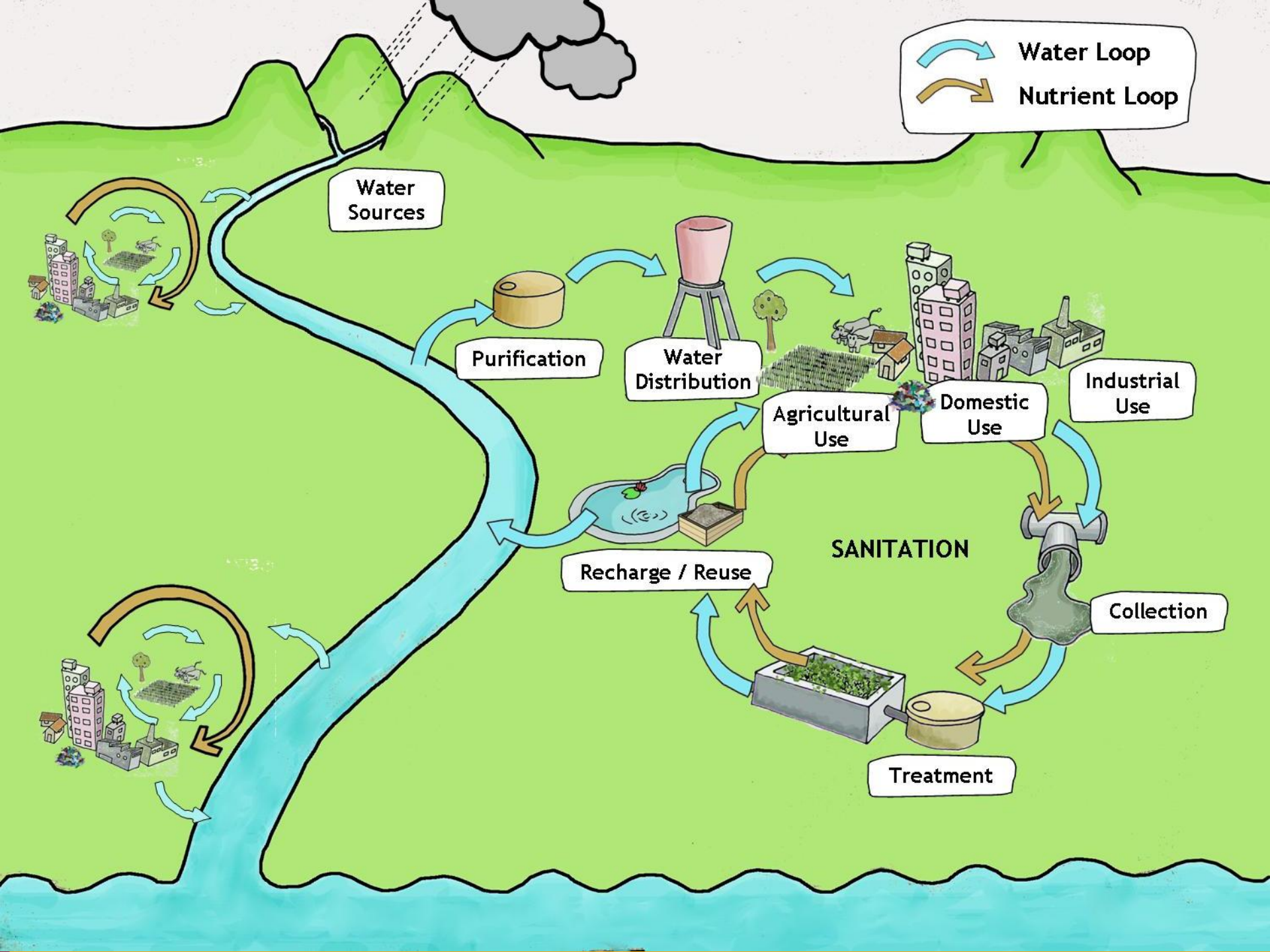
Dirty and unwanted

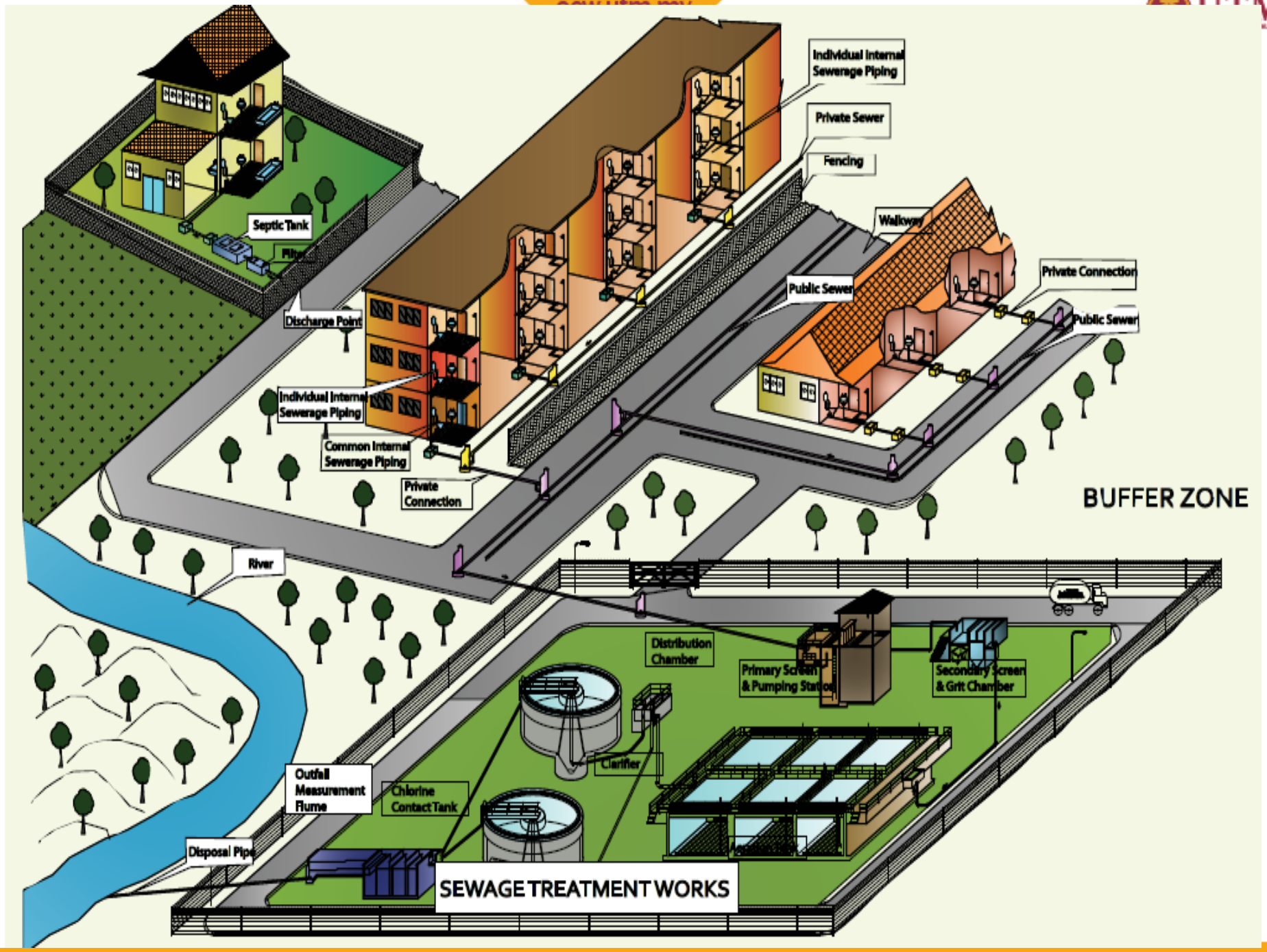
Contains pathogenic micro-organisms, and potentially harmful compounds

Harmful to health

Breeding sites for insects, pests and micro organism

Environmental pollution and affect ecosystem


Water Loop
Nutrient Loop
Water Sources
Purification
Water Distribution
Agricultural Use
Domestic Use
Industrial Use
SANITATION
Recharge / Reuse
Collection
Treatment


Individual Internal Sewerage Piping
Private Sewer
Fencing
Walkway
Septic Tank
Public Sewer
Private Connection
Public Sewer
Discharge Point
Individual Internal Sewerage Piping
Common Internal Sewerage Piping
Private Connection
BUFFER ZONE
River
Distribution Chamber
Primary Screen & Pumping Station
Secondary Screen & Grit Chamber
Clarifier
Outfall Measurement Flume
Chlorine Contact Tank
Disposal Pipe
SEWAGE TREATMENT WORKS

Element	Engineering Task
Wastewater Generation	Quantity and wastewater characteristics
Collection system	Sewers
Treatment (wastewater and sludge)	Process selection, analysis, and design
Disposal and reuse (wastewater and sludge)	Design of facilities

References

Warren Viessman, Jr., Mark J. Hammer, Elizabeth M. Perez, and Paul A. Chadik (2009) Water Supply and Pollution Control, 8th Ed. Pearson Education

Hammer, M.J., (2005) *Water and Wastewater Technology*, 5th Ed., Pearson Education South Asia Ltd

Metcalf & Eddy., (2003) *Wastewater Engineering: Treatment and Reuse*, 4th Ed., Mc Graw-Hill

Code of Practice for Design and Installation of Sewerage System (MS1228), 1991