

Elucidating the Fate and Transport of Heavy Metals and Bacteria in Stormwater Harvesting

RGC Ref. No.
PolyU 5386/13E

Principal Investigator
Dr Daniel C.W. TSANG

Funding Scheme
Early Career Scheme

Amount Awarded
HK\$790,000

Project Duration
3.5 years

Project Status
In Progress

Introduction

HKSAR's Blue-Green Infrastructure in New Development Areas

- Sustainable water management
- Flood retention lake
- River park, etc

Sustainable Urban Drainage Systems

- *at-source*, *passive* stormwater treatment facility
- attenuating runoff volume
- improving coastal water quality
- reclaiming water for non-potable reuse

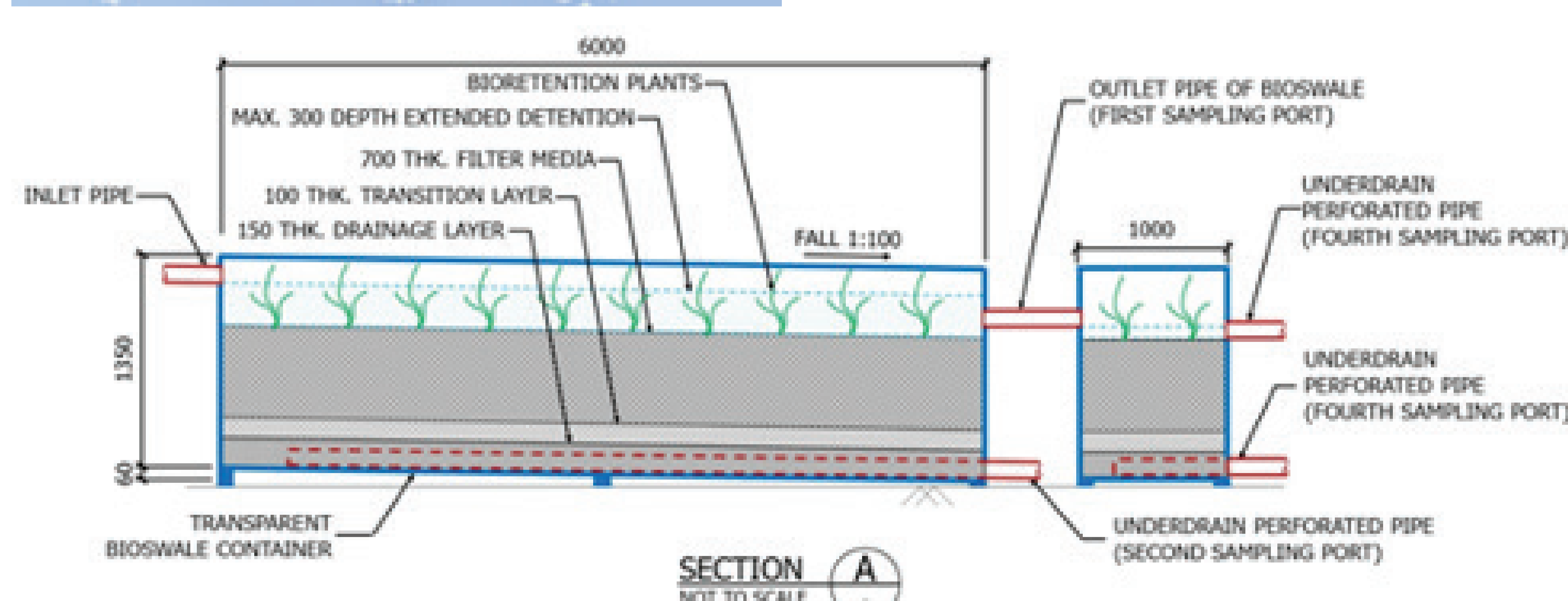
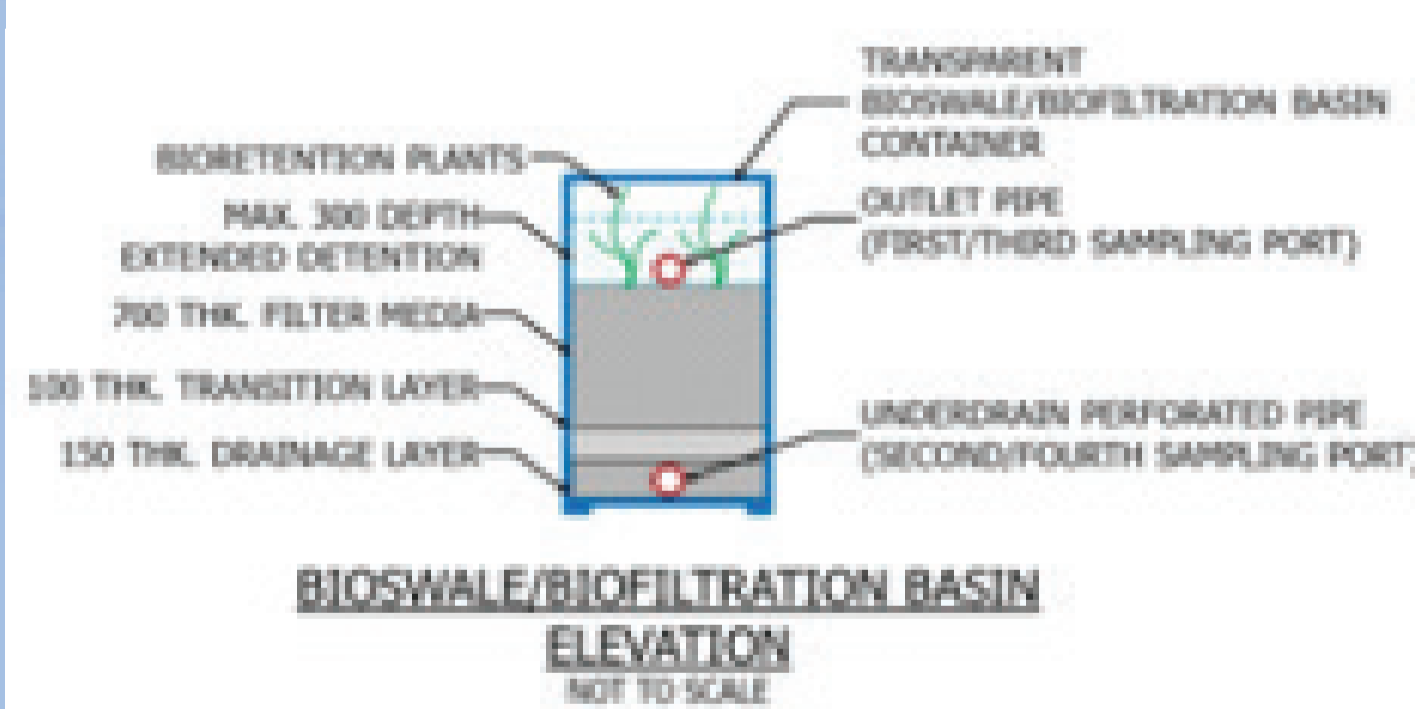


Achievement of project objectives

Research objectives and scientific questions addressed

- investigate the fate and transport of dissolved heavy metals and colloidal bacteria in laboratory-scale column experiments under varying stormwater characteristics
- elucidate the attenuation and re-mobilization of dissolved heavy metals and colloidal bacteria in laboratory-scale column experiments subjected to transient wetting-drying
- simulate the contaminant transport and breakthrough using transport models based on nonequilibrium adsorption and filtration theory
- validate the spatial distribution and leaching potential of heavy metals and bacteria in bioretention testbed

Research activities of the project

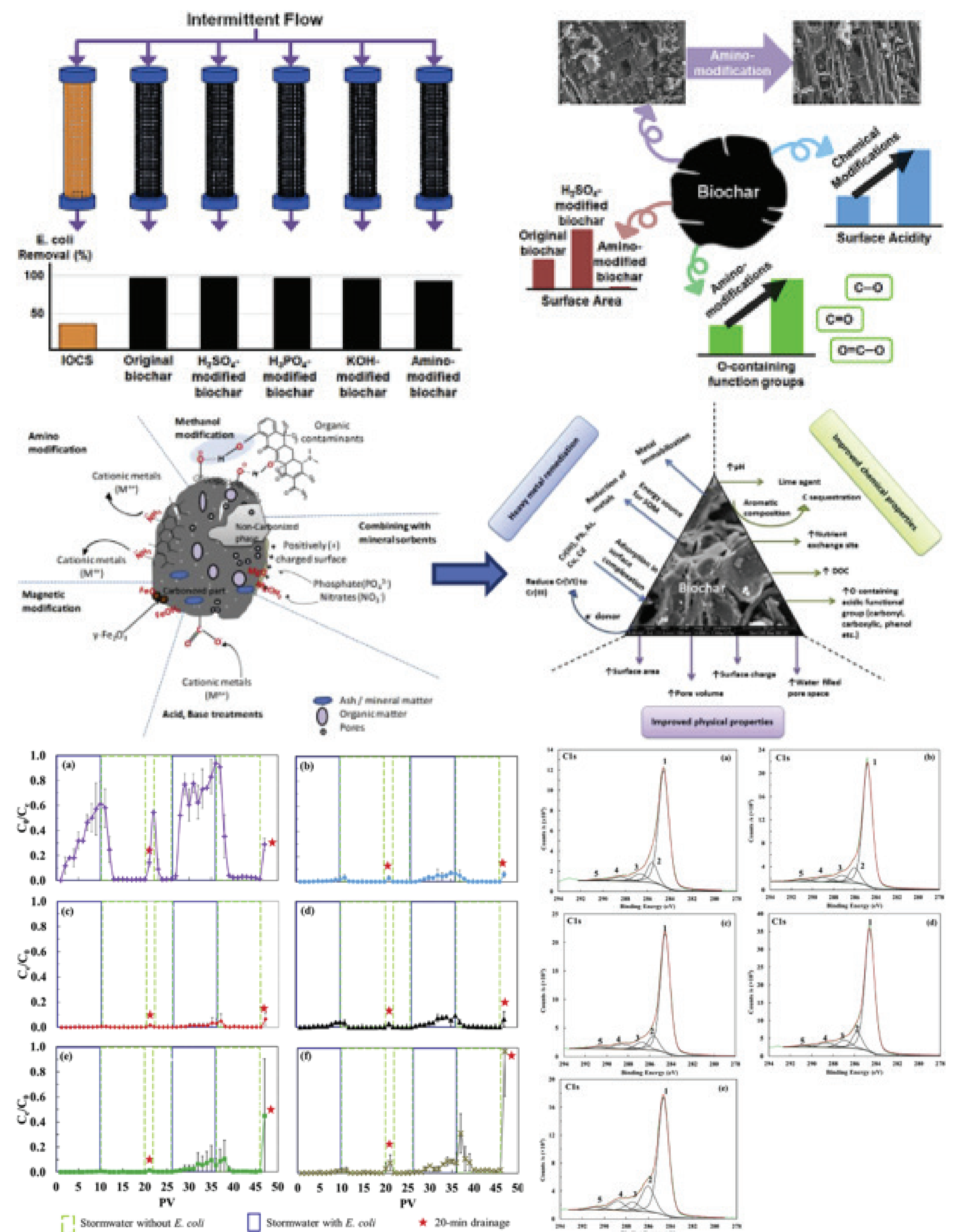


Research student trained

PhD student – Iris Ka Ming YU

Research findings

- Biochar was an effective bioretention filter media for E. coli removal
- H₂SO₄-modified biochar improved E. coli retention and reduced remobilization
- Amino-modification enriched O-containing group density and reduced porosity
- Biochar properties played a significant role in fate and transport of E. coli



Research outputs

- Lau et al. Surface-modified biochars in a bioretention system for Escherichia coli removal from stormwater. *Chemosphere*, 2017, 169, 89-98.
- Rajapaksha et al. Review on engineered/designer biochar for contaminant removal from soil and water: Potential and implication of biochar modification. *Chemosphere*, 2016, 148, 276-291.