

Quantifying Phosphorus Storage in Surface Flow Treatment Wetlands (TWs)

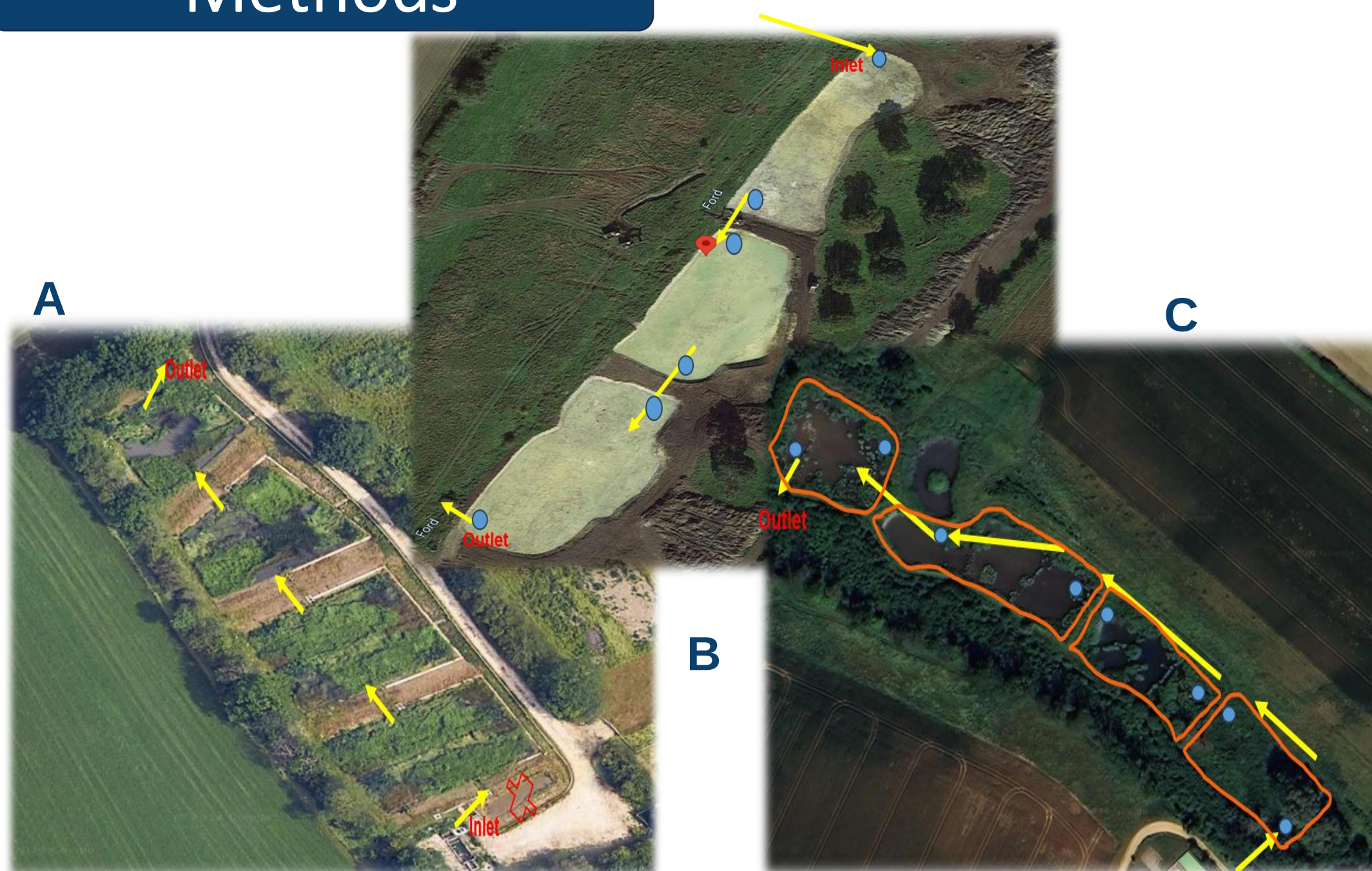
Background

- TWs have been implemented as **nature-based solutions** for wastewater treatment.
- Surface flow** treatment wetlands (TWs) can act as standalone or supplementary systems for **phosphorus** removal and are usually preceded by **primary or secondary** chemically dosed treatments.
- To optimise TWs, it's crucial to understand their efficiency with partially treated, chemically dosed wastewater and to study how different wastewater types affect phosphorus removal.

Aim

- Investigate the **removal** and **storage** of phosphorus in surface-flow treatment wetlands receiving different types of wastewaters.

Methods

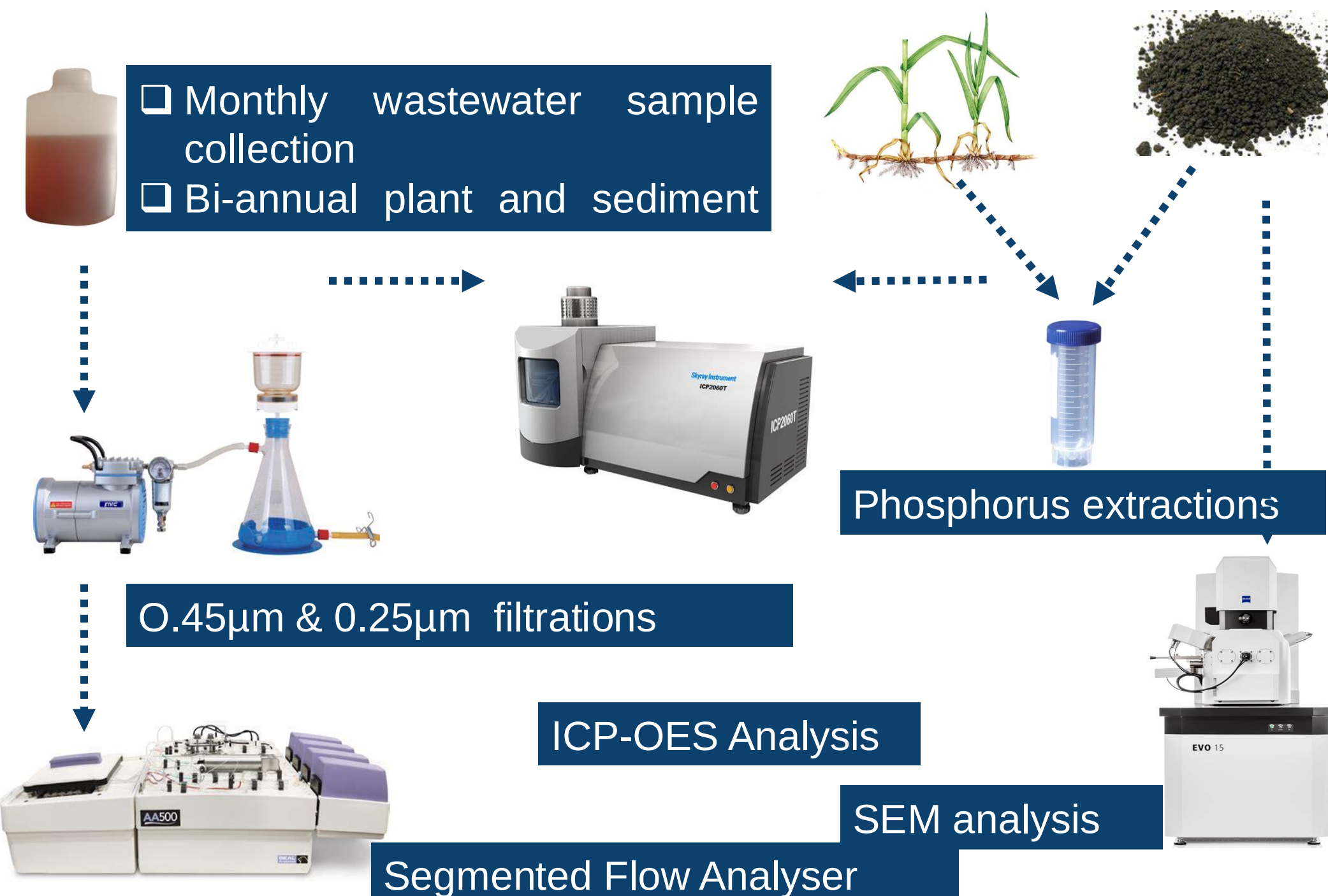


Clifton (A)

Langham (B)

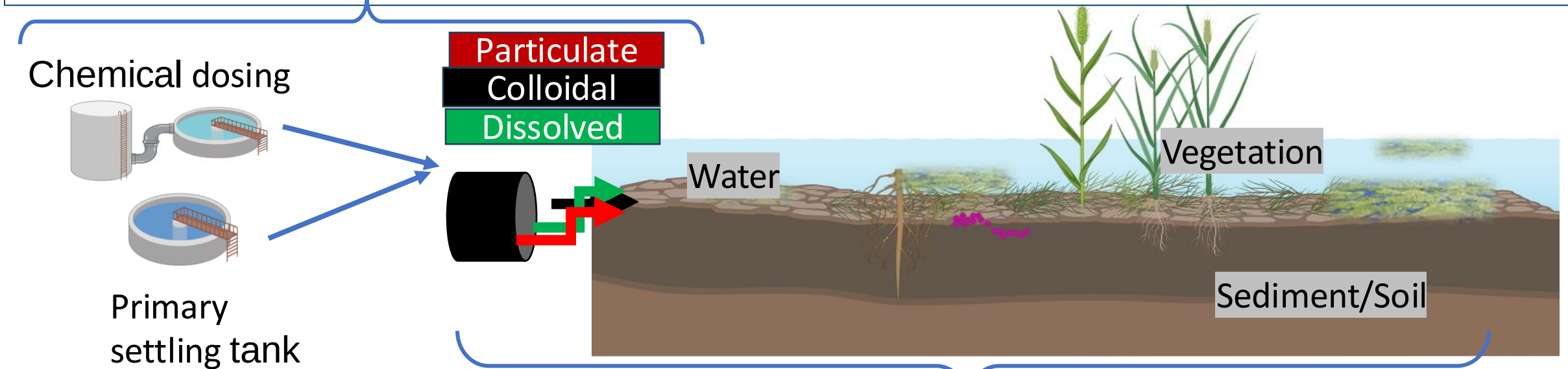
Ingol (C)

	Clifton (A)	Langham (B)	Ingol (C)
Flowsheet	Secondary treatment	Tertiary treatment	Tertiary treatment
Pre-treatment	24-hr settling	Trickling filters	Trickling filters (Fe dosed)
Cells	Parallel and series	Cells in series	Cells in series
Age (years)	3	1	6
Vegetation	All cells are vegetated	One unvegetated cell	All cells are vegetated
Surface Area (m ²)	2917	10514	10788



Research Questions

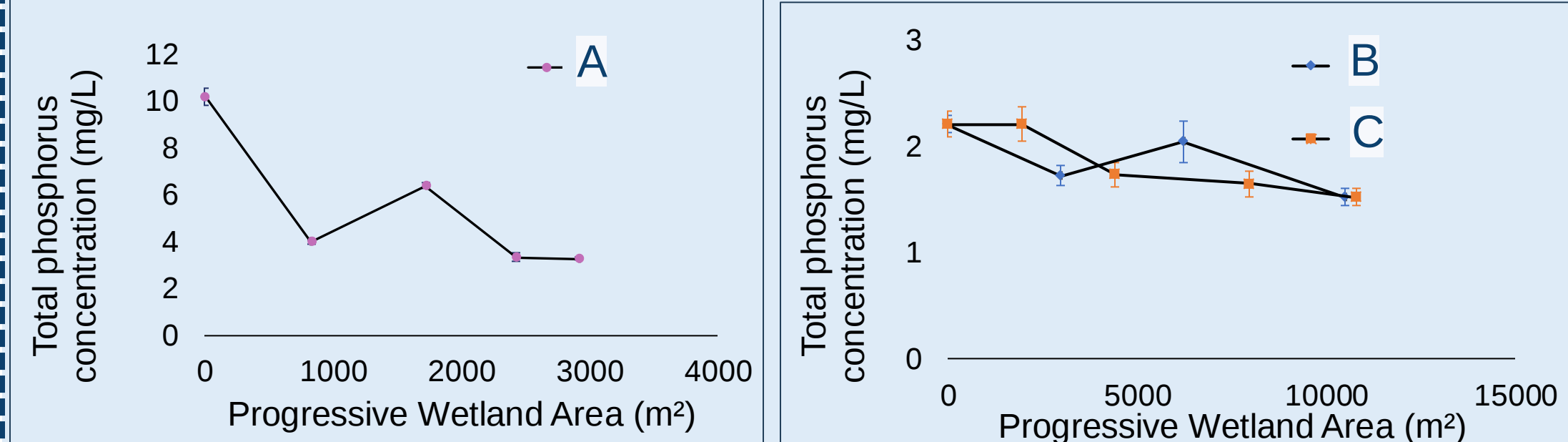
RQ1. How do upstream treatment stages affect influent **phosphorus** and removal **processes** that exist in the TW?



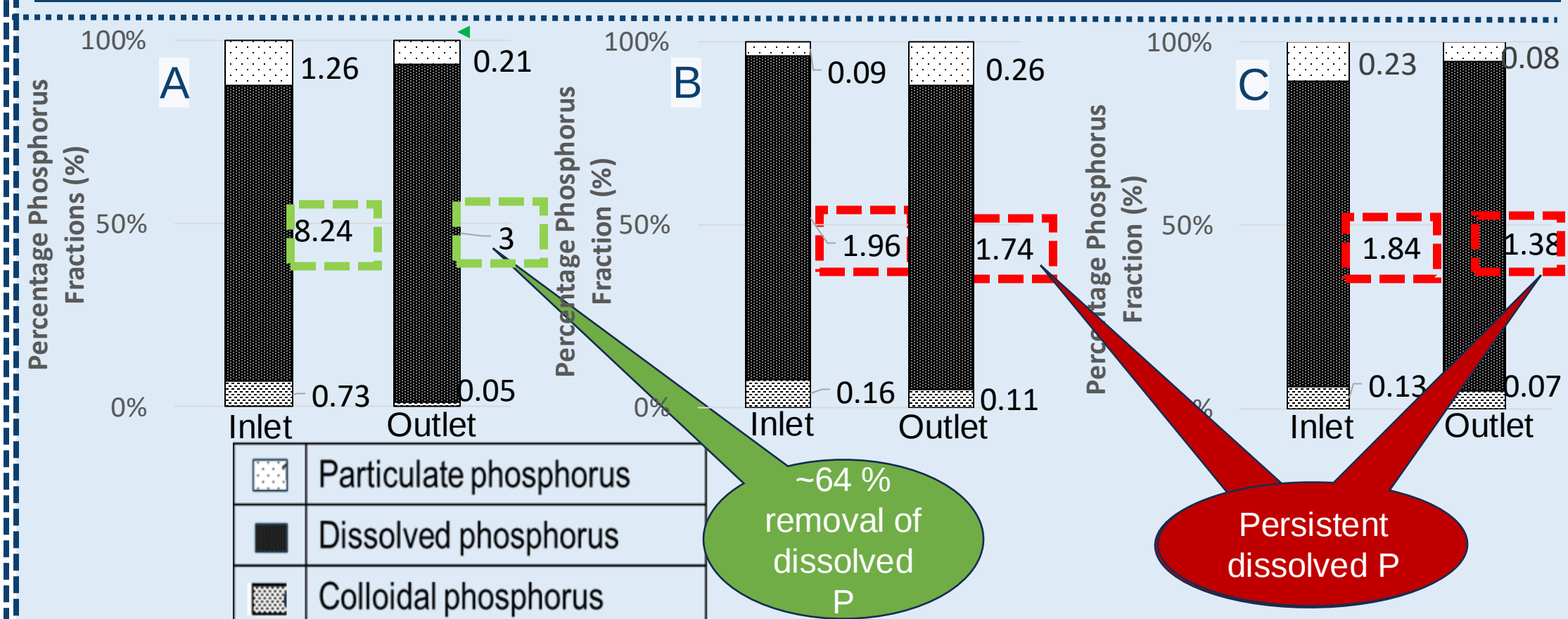
RQ2. How are different **phosphorus fractions** transformed through the wetland?

RQ3. What are the phosphorus **removal** and **storage** mechanisms in the wetland?

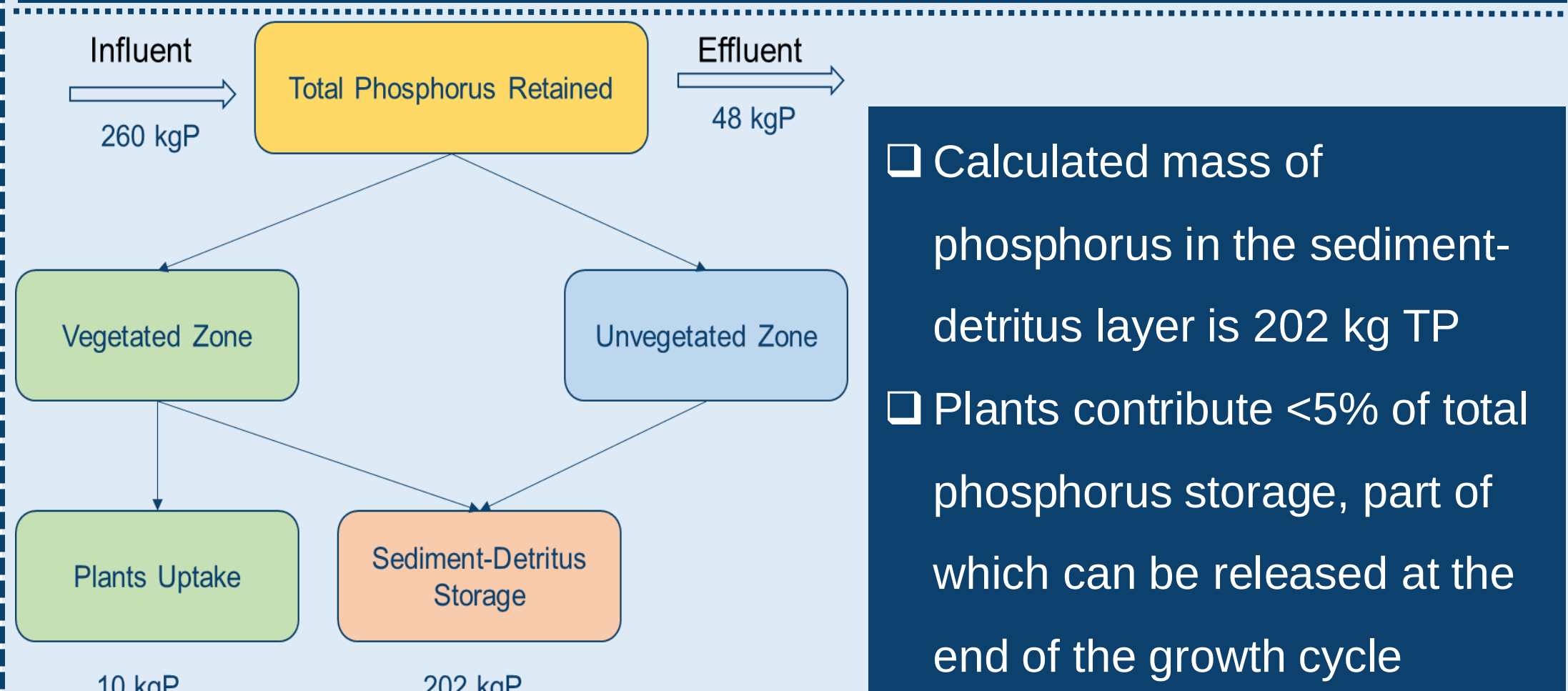
Results



A decrease in total phosphorus concentrations is observed across all sites



Optimisation of the removal of dissolved phosphorus fractions is needed to improve the performance of the tertiary treatment wetlands



Conclusions

- The dissolved phosphorus fractions dominate total phosphorus concentrations in the influent, and it remains largely untouched through the tertiary treatment wetlands.
- Average removal rates of 25.5 gP/m²/yr observed so far in the secondary treatment wetland compared to reported rates of 5 – 20 gP/m²/yr in wetlands receiving similar inputs

