

# Spatial-Temporal Dynamics of Effluent Discharge in a Tidal River System: River Tyne, UK

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**(1) WHY THIS MATTERS**

- Wastewater effluent can contain high levels of nutrients, contributing to eutrophication and declining water quality.
- In tidal rivers, bidirectional flow and complex mixing processes make pollutant behaviour difficult to predict.
- Understanding effluent dispersion is critical for improving monitoring and management processes.

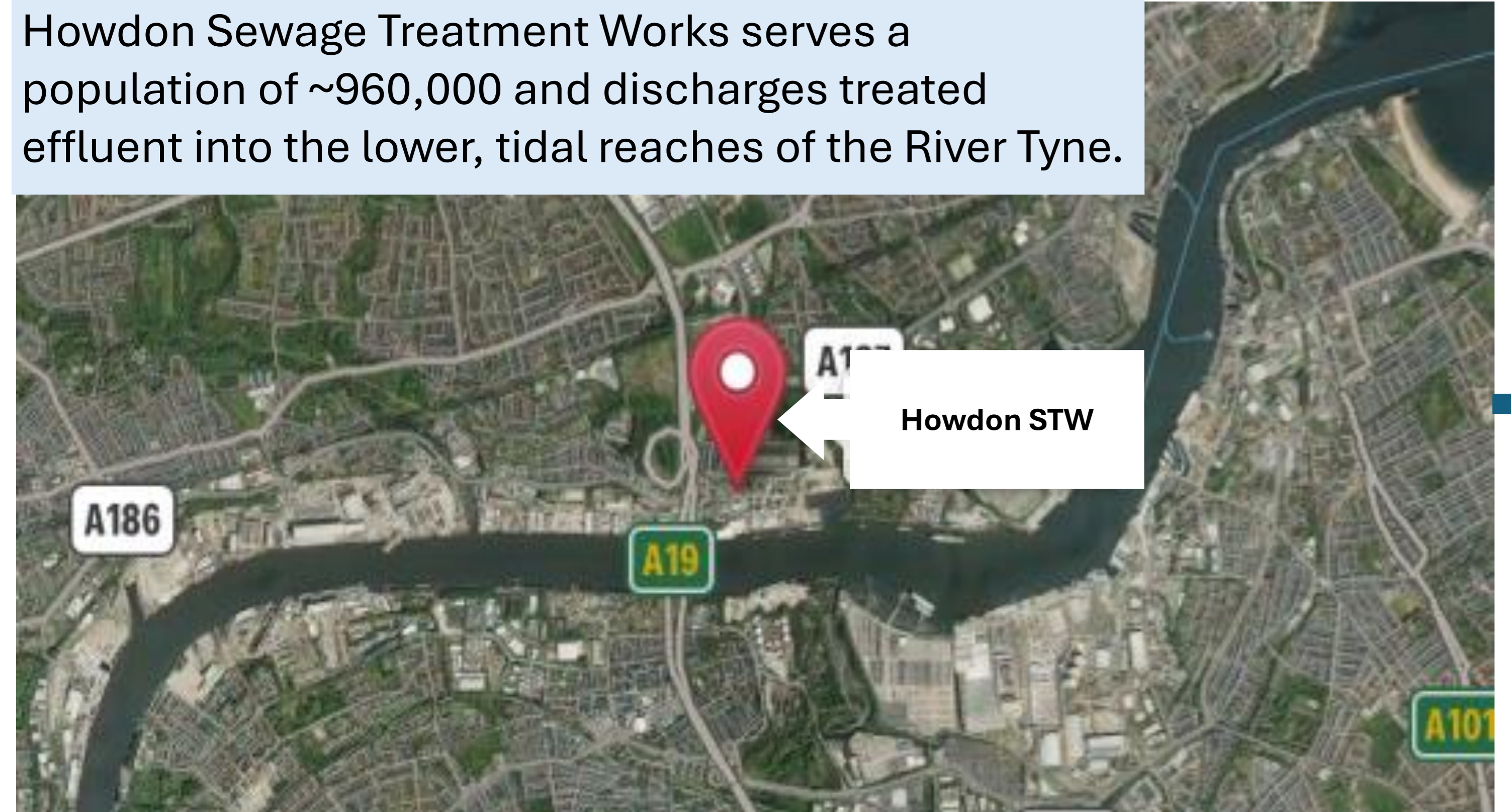
**(2) AIM & OBJECTIVES**

Aim: Investigate spatial and temporal behaviour of wastewater effluent using integrated datasets and hydrodynamic modelling.

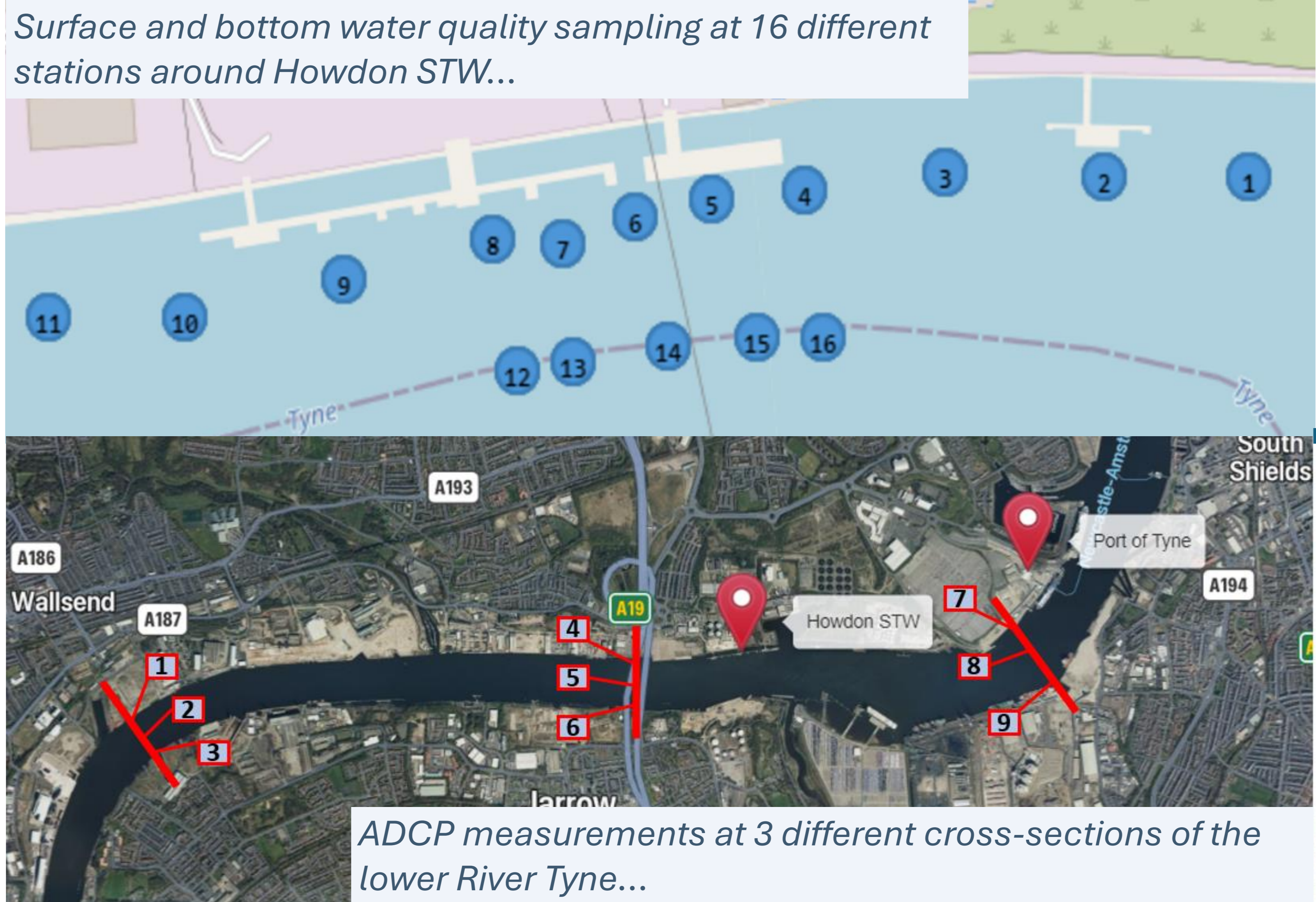
Objectives:

- Evaluate and integrate geospatial datasets
- Characterise discharge patterns
- Simulate effluent transport and dispersion

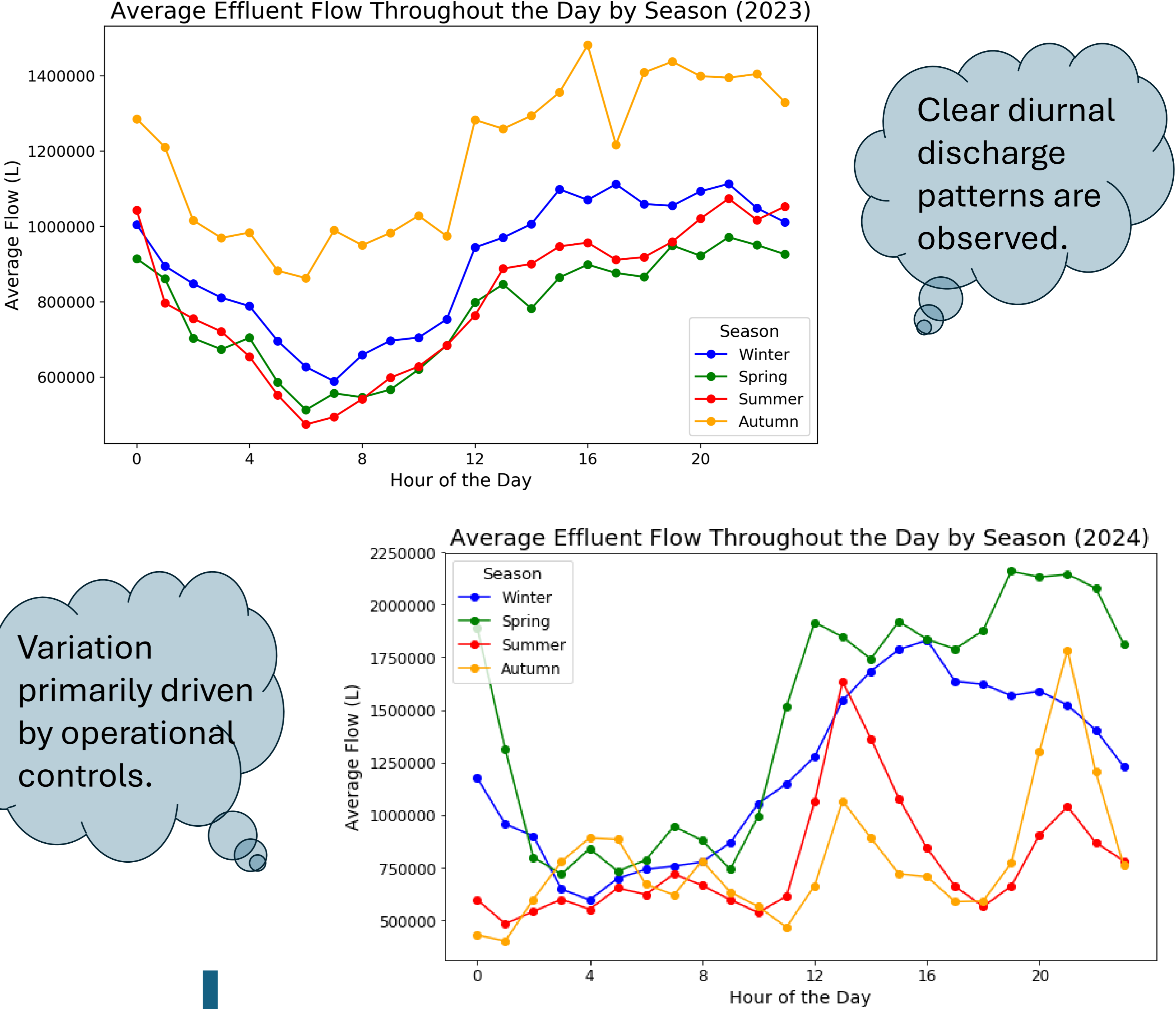
**(3) STUDY AREA**



**(5) DATA COLLECTION**



**(6) PRELIMINARY INSIGHTS**



**(4) METHODS**

Phase	Task(s)
<b>Phase 1: Dataset Evaluation &amp; Integration</b>	Assess quality and spatial limitations of key datasets (effluent discharge, rainfall, river flow, water quality)
<b>Phase 2: Effluent Characterisation</b>	Time series and seasonal analysis of effluent discharge, including correlation with environmental variables
<b>Phase 3: Hydrodynamic Modelling</b>	Modelling of effluent transport using CityCAT as a support layer and WASP for 2D dispersion modelling
<b>Phase 4: Validation &amp; Analysis</b>	Comparison with field observations and ADCP-supported flow data, enabling identification of spatial impact zones.

**(7) WHAT'S NEXT?**

Next steps:

- Development and calibration of 2D hydrodynamic model (WASP)
- Validation using field data and ADCP measurements
- Simulation of effluent dispersion under tidal conditions

Future work:

- 3D modelling (MIKE 3)
- Indirect emissions assessment
- Regional scalability

