The project by Allseas is a combination of the following two assignments:

ASSIGNMENT 1

Subject: Numerical simulation of plastic transport and accumulation in rivers

Objectives: The objective is to determine the best way to model the transport of plastic particles in rivers in order to identify specific flow patterns that lead to accumulation zones of these plastic particles. The underlying idea is to use the results of numerical simulations to optimize efficiency of a plastic collection system by choosing an adequate location for the system.

Sub-objectives:

1. Review of existing studies on the transport and accumulation of (plastic) debris/pollutants in rivers
2. Literature review on existing hydrodynamic models for the simulation of river flows
3. Literature review of existing numerical models for particle tracking analysis in water systems/rivers
4. Comparison with Delft3D; choice of the most appropriate method to simulate micro and macro plastics flows
5. With the chosen model, set-up some basic test cases to perform some validation simulations with the chosen approach
    - Straight channel, obstacle, bend, etc.
    - Type of plastic particles?
    - Experimental data available? If not perform validation tests in the TUD flume?
6. Set up one or more test cases to analyse the effect on the transport of plastic particles of:
    - The particles characteristics (shape, density, size),
    - The river characteristics (current speed, bed type, river width, water depth, etc.),
    - River bends,
    - Influents to the river,
    - Constructions (e.g. bridge piles)
7. Compare the results with existing studies and/or experiments

ASSIGNMENT 2

Subject: design a detection system for plastic and detect accumulation in rivers

Objectives: The objective is to determine and/or build the best way to detect the amount of plastic particles in rivers in order to identify specific flow patterns that lead to accumulation zones of these plastic particles. The underlying idea is to use the measurements of the amount of plastic to optimize efficiency of a plastic collection system by choosing an adequate location for the system.

Sub-objectives:

1. Review of existing studies on detection and accumulation of (plastic) debris/pollutants in rivers
2. Literature review on existing hydrodynamic models for the simulation of river flows
3. Literature review of existing detecting methods for particle detecting and measurement in water systems/rivers
4. Comparison with the existing plastic sampling method, and make a decision matrix, including interference with river traffic, flow, fish, maintenance and costs.
5. With the chosen system, set-up some basic test cases to perform some validation measurement with the chosen approach

- Type of plastic particles?
- The particles characteristics (shape, density, size),
- The river characteristics (current speed, bed type, river width, water depth, etc.),

6. Compare the results with existing studies and/or experiments