

Title: Hayle Harbour Study

Client: Hayle Harbour Authority

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Study Overview

The following sections provide an overview of the optimum and preferred strategy to undertake a detailed study of the system dynamics within St Ives Bay and Hayle Harbour. The proposal can be broken down into three core components; **Desk study** of existing and available datasets/reports; **Field surveys** including topographic and hydrographic measurements and **Numerical modelling** of the system. Although each component stands alone in its merits the three will provide a detailed analytical tool for consideration of future work areas.

All of the techniques described below can be undertaken by staff within the **Coastal Processes Research Group** and the **Marine Institute** at Plymouth University.

1. Desk study

To optimise time and project costs an initial desk study would identify existing available datasets, relevant to the sites, previous reports and areas of overlap. The study would focus in particular on the temporal and spatial distribution of topographic surveys within St Ives Bay, the availability of nearshore current measurements which are crucial for validation of the numerical model, and identifying areas of research which are of primary interest to the Harbour Authority.

2. Field Surveys

The generation of digital elevation models through topographic surveys provide a detailed reference from which previous studies and future work can be assessed. These surveys are undertaken by, where access allows, an ATV using RTK GPS or by an UAV (Unmanned Aerial Vehicle) providing unparalleled coverage of the subaerial environment.

Detailed single-beam bathymetric surveys throughout the harbour and harbour entrance would provide a subtidal elevation model which can be incorporated into the UAV survey for complete coverage of the site. Using our designated nearshore research vessel we can work in shallow regions usually restricting other survey boats.

In order to develop initial characterisation, tidal currents and to prepare the ground work for a full numerical study, the deployment of an ADCP in the channel for a 2 week period is foreseen.

Numerical Modelling

Utilising the outputs from the **Desk Study** and **Field Surveys** a nearshore model (Swan / Delft 3D) can be setup to simulate the short and longer term behaviour of Hayle Harbour in response to a range of forcing conditions. Scenarios can include changes in the sediment budget, through upstream and alongshore sediment supply, response to storm events and changes due to sea-level rise.

Where funds are limited we would strongly advocate for an initial **Desk Study** and the implementation of a **bathymetric survey** of the Harbour and channel entrance. The summer months provide more daylight and periods of calm conditions which enable more rapid hydrographic data collection. A follow up survey in the winter would also provide a detailed insight into the seasonality of the system.

A more comprehensive scheme of work can be provided following further discussion concerning the spatial area of interest and client requirements.