

Southsea Tracer Study 2023 - 2024

A tracer pebble study was undertaken by Coastal Partners in 2023-2024 on behalf of the Southsea Coastal Scheme, along a 5 km stretch of coastline between Southsea Castle and Eastney Spit, along south Portsea Island. This study helped to further understand sediment transport pathways and rates along this frontage. The results have fed into the Southsea Beach Management Plan (BMP) as part of the Southsea Coastal Scheme.

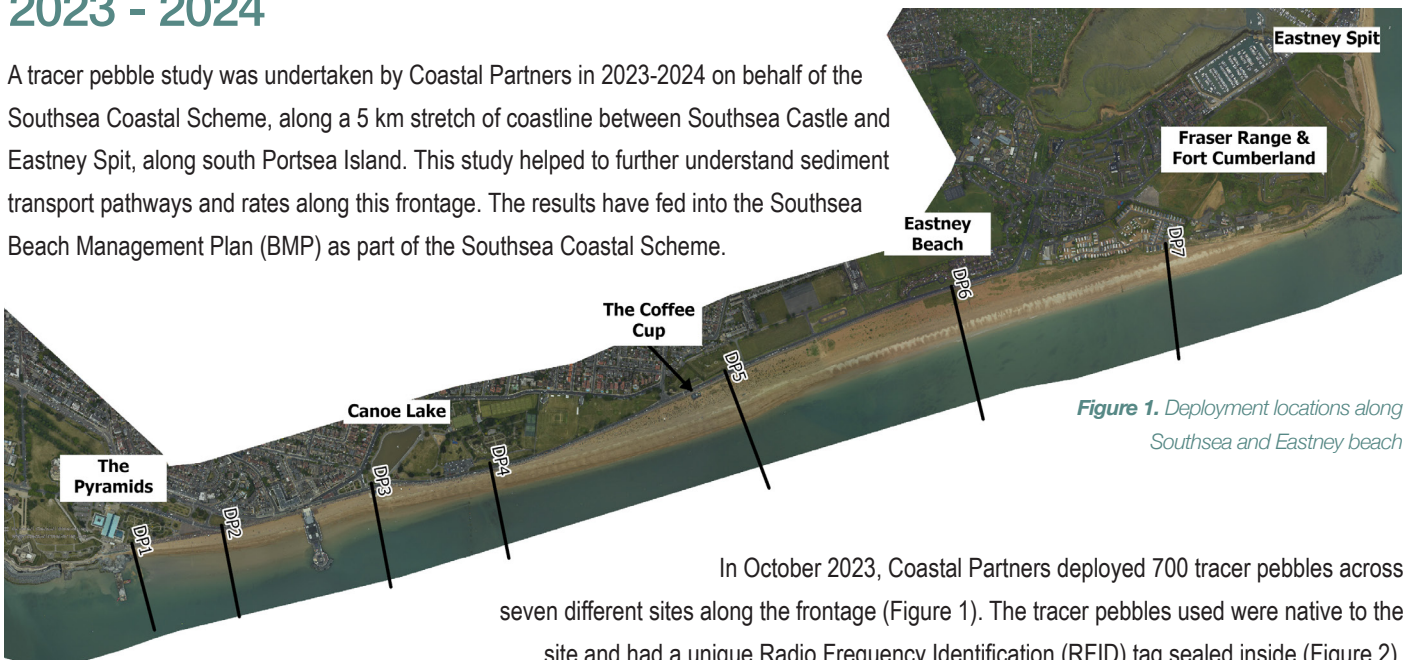


Figure 1. Deployment locations along Southsea and Eastney beach

In October 2023, Coastal Partners deployed 700 tracer pebbles across seven different sites along the frontage (Figure 1). The tracer pebbles used were native to the site and had a unique Radio Frequency Identification (RFID) tag sealed inside (Figure 2). The RFID tag broadcasts a unique ID number which was assigned to the pebble. This was detected using specialised Global Positioning System (GPS) equipment to locate the tracer pebble's precise location at a point in time. This is a novel technique for monitoring sediment transport, developed in house at Coastal Partners.

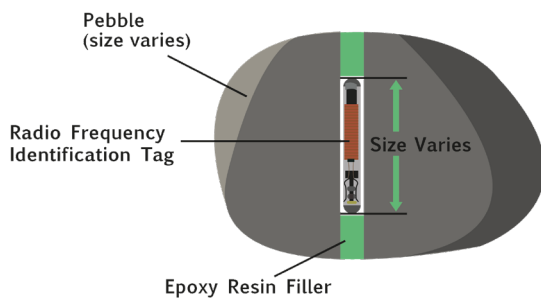


Figure 2. Tracer Pebble with radio frequency identification (RFID) tag



Deployment of Tracer Pebbles at Southsea

Nine retrieval surveys were carried out over the 12-month period from October 2023 to September

2024 to track the position of the tracer pebbles using GPS. Results from this study, in combination with additional topographic, bathymetric and volumetric data and data collected as part of the Regional Coastal Monitoring Programme, were used to provide estimates of sediment drift patterns and rates along the coastline between Southsea Castle and Eastney Spit to inform the Southsea Coastal Scheme.

The tracer pebble results identified a possible shift in sediment movement behaviour between Southsea Castle and South Parade Pier, with material predominantly migrating eastwards along this frontage. Successful bypassing of material originating east of the Pier travelling westwards towards the newly implemented Southsea rock groyne was also noted. Tracers deployed along the Eastney frontage show a net westward drift of material from Fort Cumberland to Canoe Lake, although the rate of transport varies along the coastal frontage (Figure 3).

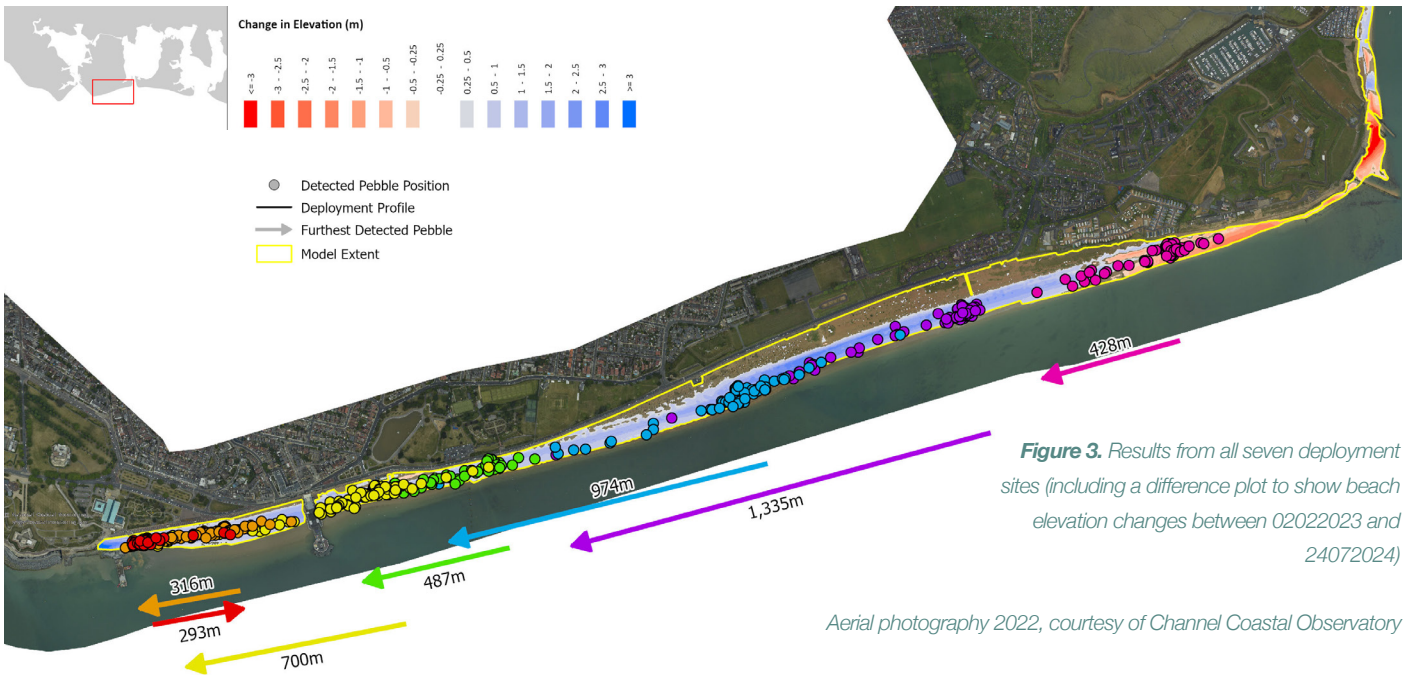


Figure 3. Results from all seven deployment sites (including a difference plot to show beach elevation changes between 02022023 and 24072024)

Aerial photography 2022, courtesy of Channel Coastal Observatory

The convergence zone identified in previous studies between Canoe Lake and South Parade Pier remains in place, although evidence of material bypassing the pier in a westward direction was identified for the first time.

The key findings from this tracer study include the identified changing sediment transport rates and directions between the Pyramids and Canoe Lake which are potentially a response to the Southsea Coastal Scheme SF5 works, including the implementation of the Southsea long rock groyne and imported beach material to widen the crest. Southsea SF5 is a phase of the Flood and Coastal Erosion Risk Management (FCERM) defence works which includes raising of the promenade, importing of offshore marine aggregate for beach nourishment and sea wall upgrades. The key findings and summary diagram of sediment transport rates and direction is shown in Figure 4.

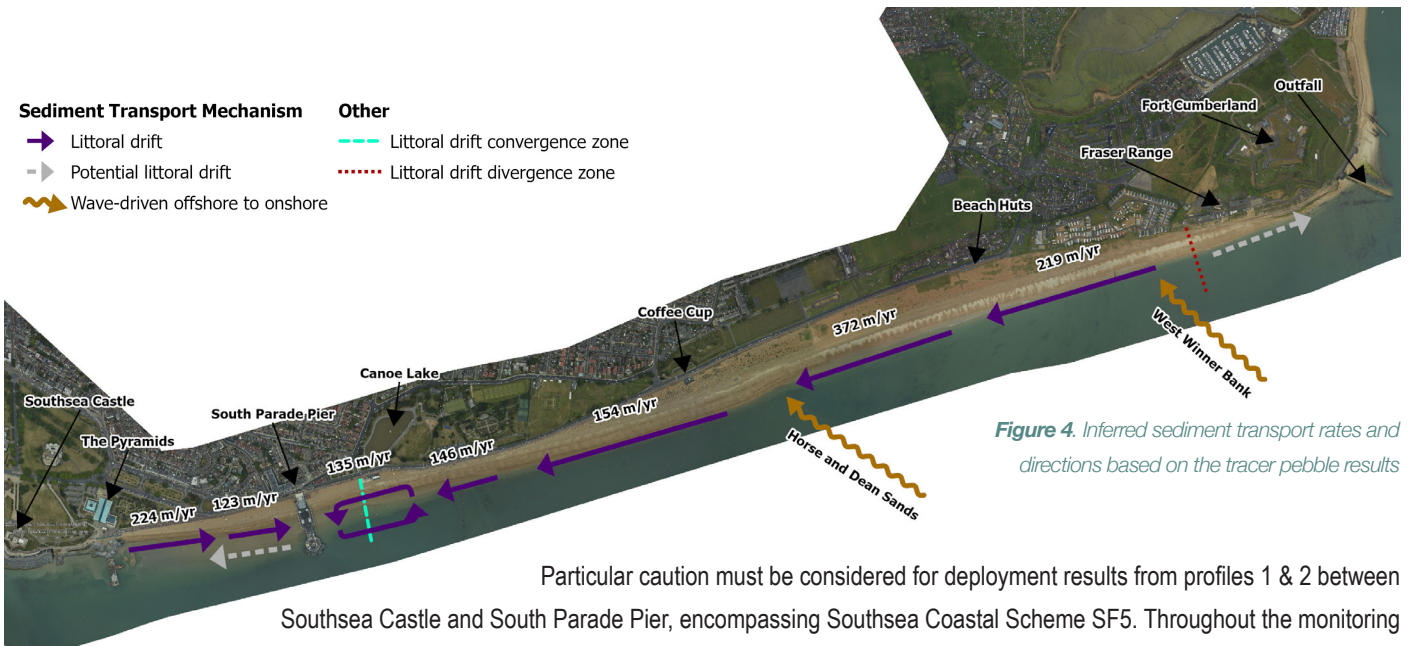


Figure 4. Inferred sediment transport rates and directions based on the tracer pebble results

Particular caution must be considered for deployment results from profiles 1 & 2 between Southsea Castle and South Parade Pier, encompassing Southsea Coastal Scheme SF5. Throughout the monitoring surveys beach material was constantly being excavated to create a bund for works during its construction phase. There was the possibility that some of the deployed tracer pebbles were artificially transported along the beach crest, affecting the results in this area.