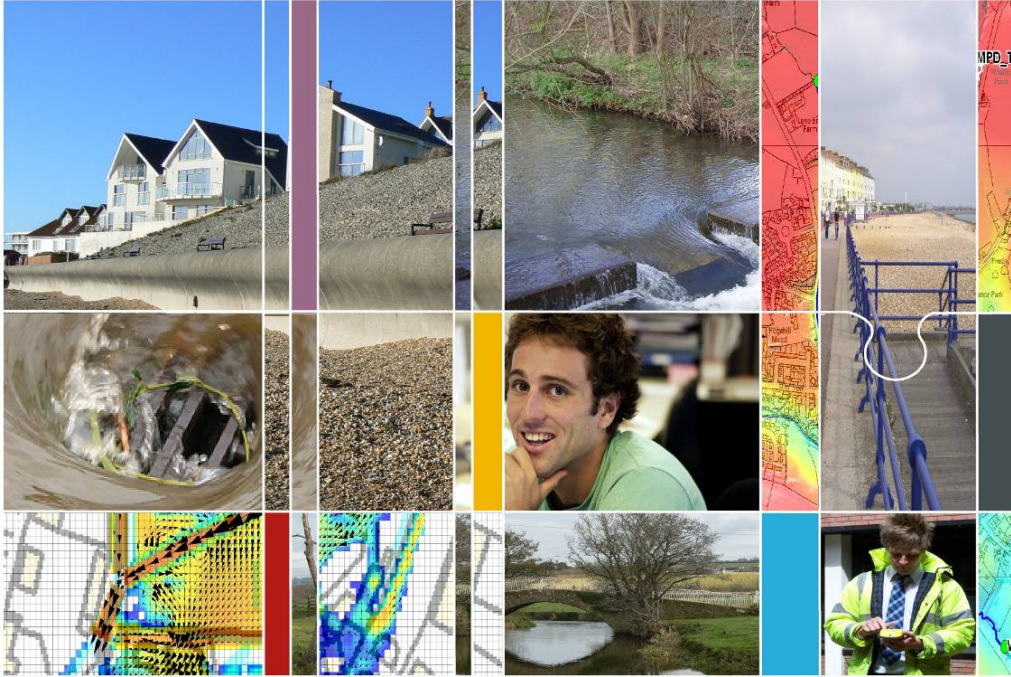


East Sussex County Council



**Cuckmere Estuary Option Impact Study
Sediment Analysis
Draft**

February 2011

1. Introduction

To aid in the options analysis and subsequent decisions to be made by the Cuckmere Estuary Partnership, a desktop study has been undertaken to assess the likelihood of saltmarsh creation within the estuary. This has been supplemented by a small suspended sediment sampling study.

The results of this study should be viewed in conjunction with the main Cuckmere Estuary Options report, to which this report will form an Appendix.

2. Existing information

In order for saltmarsh to develop in estuarine areas there needs to be a sufficient supply of sediment. In the literature review, there was little information available that was specific to the Cuckmere Estuary/Cuckmere Haven area.

The Standing Conference on Problems Associated with the Coastline (SCOPAC) group commissioned a sediment transport survey of the south coast in 2004. The report estimates that for the whole beach environment between Shoreham-by-Sea and Beachy Head, total inputs by offshore to onshore processes are unlikely to exceed 30,000m³/yr and the sediment type is likely to be well sorted sands.

A report into the suspended particulate matter in the eastern English Channel (Velegrakis *et al.*, 1999) roughly estimates that there is 3-5mg/l of suspended particulate matter in surface waters of the English Channel and that the highest concentration tends to occur in winter.

There is a significant amount of literature on saltmarsh and its creation, however, much of the literature is more focussed on the east coast of England.

An investigation carried out into the sedimentary response of Pagham Harbour by Cundy *et al.* (2002) calculated the sediment accumulation rates at Pagham and compared it to other marshes on the south coast. The results are shown in Figure 2-1.

Figure 2-1 – Vertical Sediment accumulation rates reported for southern England (from Cundy *et al.* 2002)

Table 1
Vertical sediment accumulation rates reported for southern England salt marshes and managed-realignment trial sites

Site	Site type	Rate of sediment accumulation	Method used for determining sediment accumulation rate	Reference
Pagham Harbour, southern England	Back-barrier <i>Spartina</i> marsh	5 mm a ⁻¹	²¹⁰ Pb and ¹³⁷ Cs dating	This study
Hamble estuary, southern England	Estuarine <i>Spartina/ Halimione</i> marsh	4–8 mm a ⁻¹	²¹⁰ Pb and ¹³⁷ Cs dating	Cundy and Croudace (1995)
Poole Harbour, southern England	Estuarine <i>Spartina</i> marsh	8 mm a ⁻¹	²¹⁰ Pb and ¹³⁷ Cs dating	Cundy and Croudace (1996)
Christchurch Harbour, southern England	Estuarine <i>Spartina</i> marsh	4–8 mm a ⁻¹	²¹⁰ Pb and ¹³⁷ Cs dating	Cundy and Croudace (1996)
Lymington estuary, southern England	Coastal <i>Spartina</i> marsh	3–4 mm a ⁻¹	²¹⁰ Pb and ¹³⁷ Cs dating	Cundy and Croudace (1996)
Beaulieu estuary, southern England	Estuarine <i>Spartina/ Halimione</i> marsh	3 mm a ⁻¹	²¹⁰ Pb and ¹³⁷ Cs dating	Cundy <i>et al.</i> (1997)
Yarmouth, Isle of Wight, southern England	Estuarine <i>Spartina</i> marsh	3–5 mm a ⁻¹	²¹⁰ Pb and ¹³⁷ Cs dating	Cundy and Croudace (1996)
Hythe, Southampton Water, southern England	Estuarine <i>Spartina</i> marsh	5–8 mm a ⁻¹	²¹⁰ Pb and ¹³⁷ Cs dating	Cundy <i>et al.</i> (1997)
Tollesbury, Essex, SE England.	Managed-realignment trial site	Up to 40 mm a ⁻¹ at low elevations, 3–5 mm a ⁻¹ at high elevations	Sedimentation–erosion table	Cahoon <i>et al.</i> (2000)
Northey Island, Essex, SE England	Managed-realignment trial site	5 mm a ⁻¹ initially, declining to virtually zero after 4.5 years	Accretion plates	Burd (1996)

The closest area of saltmarsh detailed in Figure 2-1 to the Cuckmere Estuary is that at Pagham Harbour. The table indicates that the rate of accumulation is 5mm/yr. The report does also state that the area of the saltmarsh at Pagham has on average decreased in size by 0.0087km/yr.

3. Sediment sampling study

In December 2010, Capita Symonds undertook a small suspended sediment study in Cuckmere Haven to assess the suspended sediment load within the water column in the sea water at the river mouth. The study was carried out on December 23rd 2010 at mid way through the incoming tide. There had been no significant wave action or storms for two to three months prior to the sampling, and the prevailing wind direction over preceding weeks had been a north easterly.. The samples were collected from approximately 1m below the water surface. Five samples were taken at random locations within the Haven.

Due to time and budget constraints, the samples could not be sent away to be dried and weighed. Therefore, the samples were placed in vertical tubes and left to settle. The height of the settled sediment and the water were measured and a percentage calculated. The results are shown in Table 3-1.

Table 3-1 – Results from sediment sampling in Cuckmere Haven

Sample	Depth (mm)	Length (mm)	%	Tolerance +10mm	Tolerance -10mm
1	2.5	2700	0.09%	0.1%	0.1%
2	2.0	2705	0.07%	0.1%	0.1%
3	3.5	3510	0.10%	0.1%	0.1%
4	1.0	2233	0.04%	0.0%	0.0%
5	2.0	2770	0.07%	0.1%	0.1%
Average	2.2	2783.6	0.08%	0.1%	0.1%

The sampling shows that even following a long period of relatively calm weather with very little wave action, there is still a significant volume of sediment in suspension within the water column. This indicates that given favourably sheltered low velocity conditions in the Cuckmere Estuary, there is likely to be enough sediment present in the water column to enable saltmarsh to form.

4. Conclusion

The desktop study and sampling data shows that the creation and accretion of saltmarsh within the Cuckmere Estuary is probable. There is sediment currently in suspension within the local water column which is likely to settle out. It cannot be assumed that it is a definite outcome due to the uncertainty over the future of the beach, sediment sources and the associated tidal and wave behaviour. Creating a sheltered environment, protected from constant wave action, where water can stand for a prolonged period should promote saltmarsh creation.