**TITLE- should indicate what the paper is about**

**Introduction**

* What is problem? State what the paper will address and outline the context

**Approach**

* Explain the method and highlight anything that is novel about the approach being presented?

**Results & Discussion**

* Some results and, if space allows, some interpretation of the findings

**Conclusions**

* So what? Summarise main points and why this is significant

**Note**: the emphasis will vary depending on whether this is being written as an abstract for conference paper, or a summary note for a client.

* *Abstract* should highlight what is original or novel in the work being presented;
* *Summary note* should major on how the work has contributed to solving the client’s problem.

**A Rapid Assessment of Morphological Change due to Dredging in Southampton Water, UK**

**Introduction**

Several previous expansions of the Port of Southampton have resulted in a substantial change in the morphology of the estuary. Further expansion plans, including a channel deepening in 2020 and a new berth development requiring a reclamation is planned for 2030. This note provides a rapid assessment of these two schemes and presents the results within the context of the historical changes.

**Approach**

|  |
| --- |
| A graph with numbers and lines  Description automatically generated |
| **Figure 1 - Results for dredge in 2020 and reclamation in 2030, superimposed on historic changes** |

The ASMITA model[[1]](#footnote-1) has been used to evaluate the changes. The model aggregates change within defined elements and uses an equilibrium based on the tidal prism as a proxy for equilibrium sediment concentration. For this application, the estuary has been schematised using 4 elements, comprising an outer channel and flat and an inner channel and flat. The model was validated using the historical data. A dredged channel was introduced into the two channel elements, 200m wide, 2m deep and 18km long, requiring the removal of 7.2Mm3 in 2020. The reclamation removed an area of 0.2Mm2 and a volume of 0.5Mm3 from the inner tidal flat in 2030.

**Results & Discussion**

The four cases examined are detailed in Table 1 and illustrated in Figure 1. Substantial changes in the twentieth century have clearly dramatically changed the evolution that would have happened under sea level rise alone. This puts in context the much smaller changes introduced in the years 2020 and 2030. The proposed dredge further exacerbates the increase in volumes of the system and this impact is slightly reduced by the subsequent reclamation, although the reduction is comparatively small. Table 1 also summarises the changes in total water volumes and the morphological change. These can be compared with the volume change due to sea level rise of 2mm/year, which over 200 years would be an increase of 1.4e7 m3. Thus under sea level rise alone the system accretes (negative morphological change) at approximately the rate of sea level rise. However the historical change far exceeds this so that the system is unable to infill at a rate compatible with sea level rise (reducing the fixed volume change by 19%). The proposed dredge increases this impact by further reducing the fixed volume change by 8%, with a small offset in these changes when the reclamation is added.

**Table 1 - Change in total volume in m3 for all four elements between 1900 and 2100 (V2100-V1900)**

|  |  |  |
| --- | --- | --- |
| Case | Moving surface volume  (water volume change) | Fixed surface volume  (morphological change) |
| 1 – sea level rise of 2mm/year | 1.00E+05 | -1.38E+07 |
| 2 – As 1, with ntc of 0.15m | -4.00E+05 | -1.49E+07 |
| 3 – As 1 with historic changes | 6.70E+06 | -5.20E+06 |
| 4 – As 3, with dredge in 2020 | 1.09E+07 | -1.60E+06 |
| 5 – As 4, with reclamation in 2030 | 1.02E+07 | -2.30E+06 |

**Conclusions**

The results highlight the significant impact of the historical changes and the further impact likely to result from the proposed channel deepening. By comparison, the reclamation is shown to have a relatively minor effect. These results also provides a basis for testing and evaluating the results from more detailed process modelling studies.

1. Stive M J F, Capobianco M, Wang Z B, Ruol P and Buijsman M C, 1998, Morphodynamics of a tidal lagoon and adjacent coast, Dronkers J and Scheffers M B a M(eds), Physics of Estuaries and Coastal Seas: 1996, pp. 397-407, A A Balkema. [↑](#footnote-ref-1)