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Creating clay from Sediment

Project Living Lab Schorerpolder

Introduction

Schorerpolder is located west from the North Sea Port in Vlissingen, who will use it as nature compensation for further port expansion.[1]. According to the Tauw Report the Schorerpolder project might face a problem with sedimentation buildup that might have to be dredged away to meet the objectives of the nature compensation.[1]

This research examines the possibilities of using this sediment resource to produce clay in a so called Clay Ripener (see figure 1) and how much sediment we can harvest, with the objective to use the clay output in construction or strengthening of dikes. Furthermore we investigate which of the 4 design options would support this function.

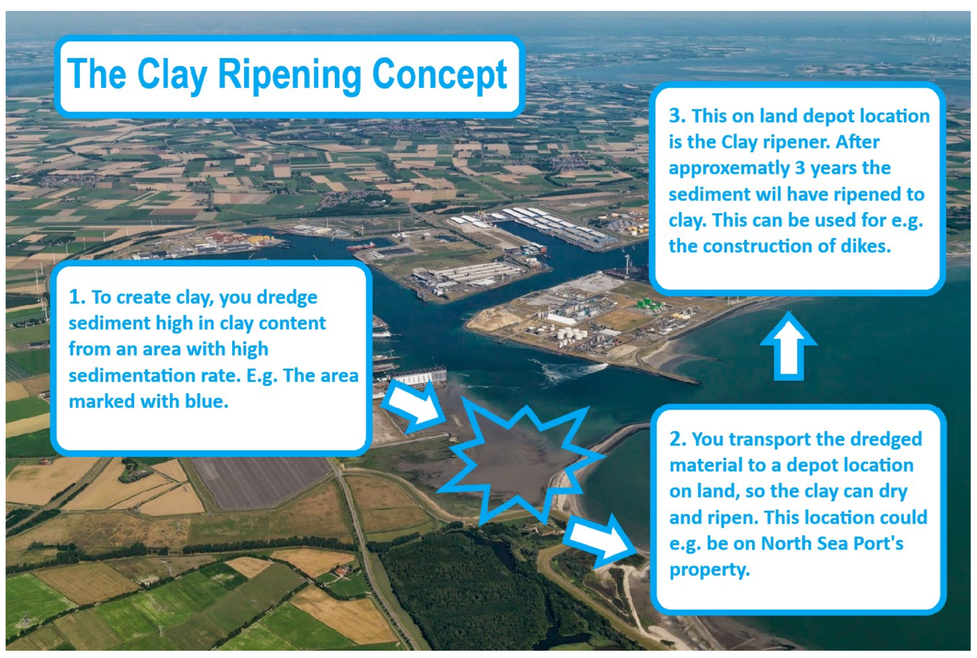

Figure 1. The clay ripening concept

Method

To investigate the possibilities of using the Sediment in a Clay Ripener and the possibility of viable implementation in the Schorerpolderpr project, this project studied the knowledge generated by the Clay Ripening Pilot project in Eems-Dollard. Unfortunately the Pilot is in its beginning phase and there are no clear conclusions that Clay ripening is feasible and viable. Furthermore the Sediment composition was investigated in Harbour sediment reports to conclude if the sediment is suitable for Clay Ripening.

To find the best supporting design the Tauw Report was consulted to find the sedimentation rates of the different designs and the size of the area that potentially could be dredged. With this information the amount of material in m^3 that can be dredged could be calculated.

Results

The best design alternative to accumulate sediment for the clay ripener, has shown to be the Separated Functions (see figure 2 and 3) as the sedimentation rate is about 7 cm/y while the other designs only have sedimentation rates of 1- 2 cm/y.[1]

The approximate area with the sedimentation rate of 7 cm/y is 50 ha.[1] Dredging of 5 out of 7 cm/y in order to have an accumulation of 2 cm/y, will give an output volume of 25,000m^3. The amount of sediment load in Schorerpolder is rather small in comparison to the Clay Ripening Pilot project (se figure 2).

The composition of the sediment in Schorerpolder is only 25% silt and clay and 75% is fine sand.[3] In comparison with the pilot this is a very low clay content.

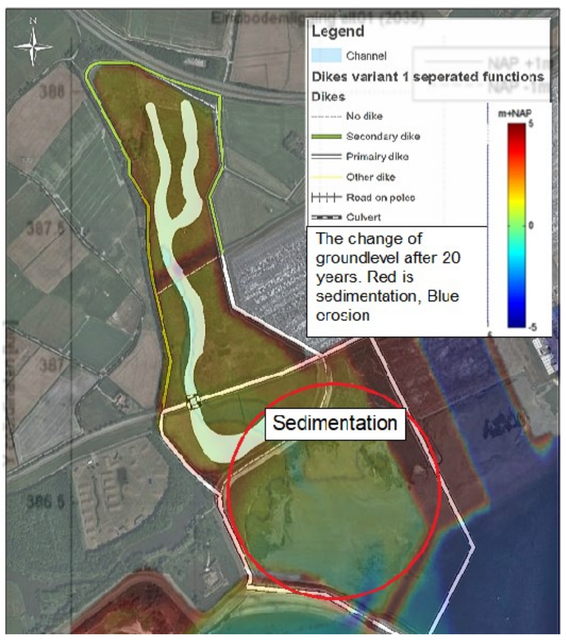

Figure 2. Sedimentation in the Separated function.

Design preference




Design alternatives:	Open Connection	Controlled Tide	Separated Functions	Combined Perspectives
Sedimentation rate	<10.000 m^3/y	<10.000 m^3/y	25.000 m^3/y	<10.000 m^3/y
Sediment composition:	75% Fine sand	75% Fine sand	75% Fine sand	75% Fine sand
Costs:	Unknown	Unknown	Unknown	Unknown
Sedimentation rate:	1-2 cm/y	1-2 cm/y	7 cm/y	1-2 cm/y
Design preference:	x	x	√	x

	Suitable
	Neutral
	Not suitable
	Unknown

Figure 3. Design Preference.

Eems Dollard Clay Ripening Pilot Project	
Sediment load	310.000 m^3
Budget (Implementation)	€4.527.500,-
Sediment Composition	High in silt and clay
Depot Size	22 parcels of total 22 ha

Figure 4. Eems-Dollard Pilot Project

Discussion

Ranking of the alternatives was based on pilot project of the clay ripener. As it is ongoing the costs, effects, and outputs are completely unknown and might change based on the finish. The first choice is separate functions as others show a relatively low sedimentation rate. Although the incoming sediment is all fine sand which is not the most suitable for creating clay ripener.

This indicates further research is needed. Possible questions for further research could be:

1. Is the sediment of suitable quality for the clay ripening process?

2. What is the clay output amount after the sediment has ripened?

3. Is it be feasible to extract that amount of clay

4. **What could be the alternative usage of the sediment?**

Conclusion

This research can conclude that it is possible to dredge 25.000 m^3/y in the Schorerpolder if the suggested “Seperated Function” design will be chosen. But because of the low content of clay in the sediment and lack of knowledge from pilot project concluding if it’s viable and feasible to ripen clay on such a small scale, its not possible for this research to conclude if a clay ripening project will be possible to implement in the Schorerpolder project. This research suggests further research to be done.

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