Master plan for disposal facility for dredged material “the Slufter”: past, present, future

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contents

- The Slufter
- Why a Master plan
- Main topics and conclusions

The Slufter, large disposal facility for contaminated sediments

- constructed in 1987
- diked disposal facility, constructed in the sea
- Depth of 28 m, height of the dike is 24 m
- Volume of 100 million m3

Location of the Slufter on the Maasvlakte

Masterplan: transition from “subaquatic” to “upland type” disposal site

- 1987 - present: Subaquatic disposal facility
- 2006 - ?”: upland disposal site

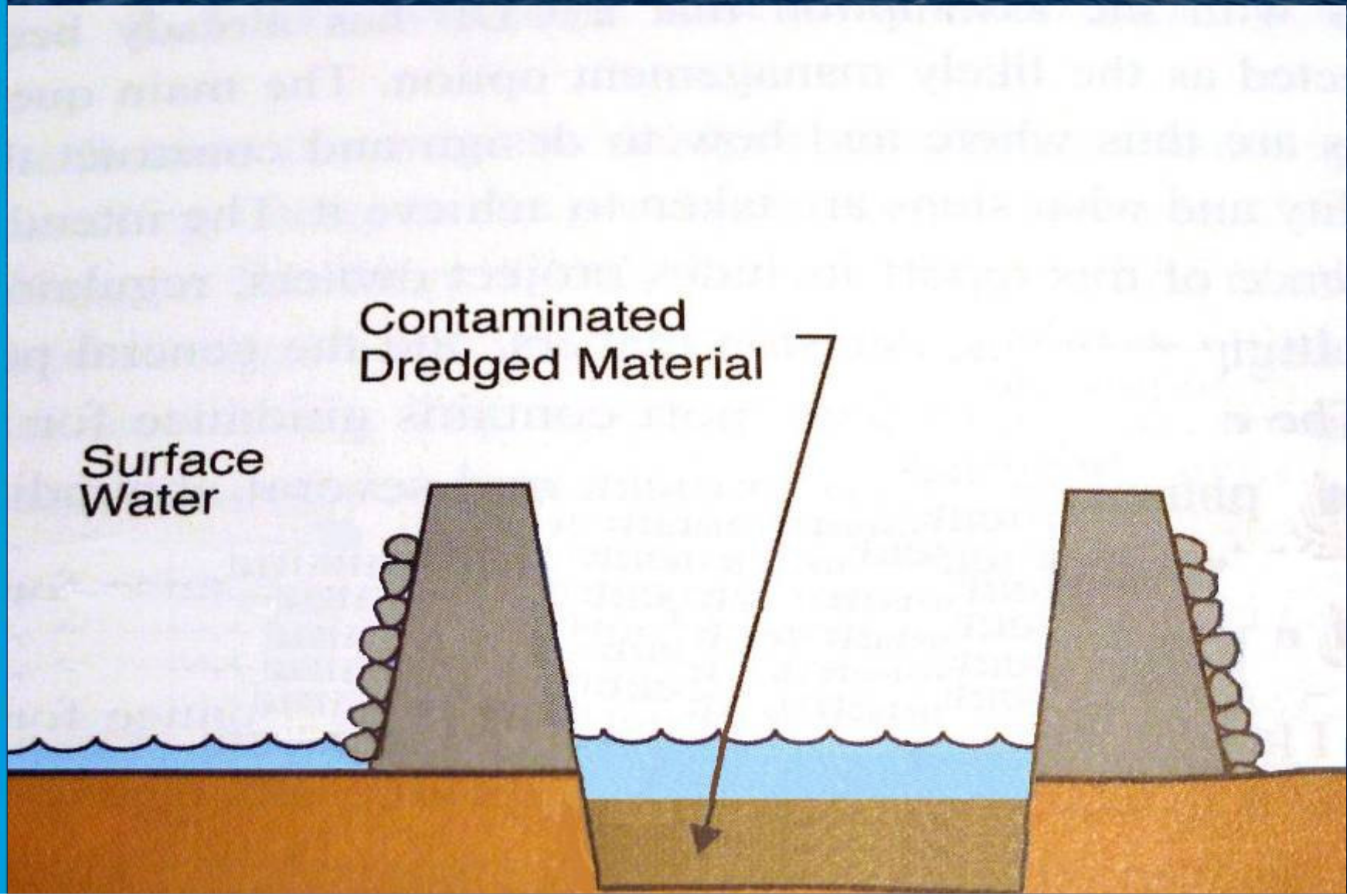
Main questions to be answered:

- Expected exploitation period Slufter
- Layout of the disposal site in the “upland” phase
- Treatment of DM for benificial use
- Monitoring of groundwater
- Treatment of effluent
- Other functions of disposal site

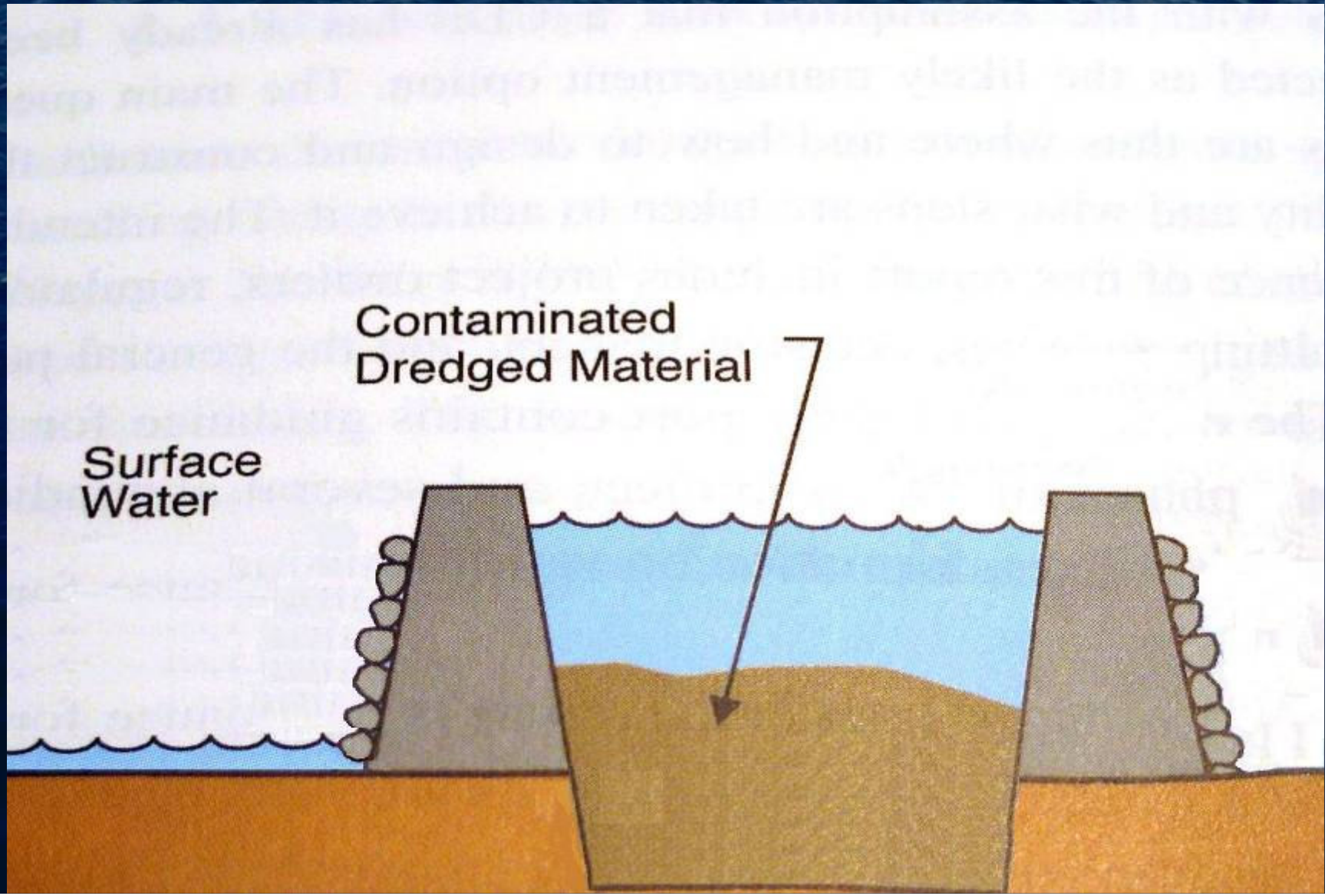
Exploitation period

	Supply "own" DM	Supply "market"	Treatment DM	Expl. until:
1	slowly decreasing	30 %	minimum (only sand separation)	2025
2	faster decreasing as in scenario 1	30 %	maximum (Sand separation + ripening 150.000 m^3/y)	2048
3	slowly decreasing	10 % depot volume	minimum (only sand separation)	2060

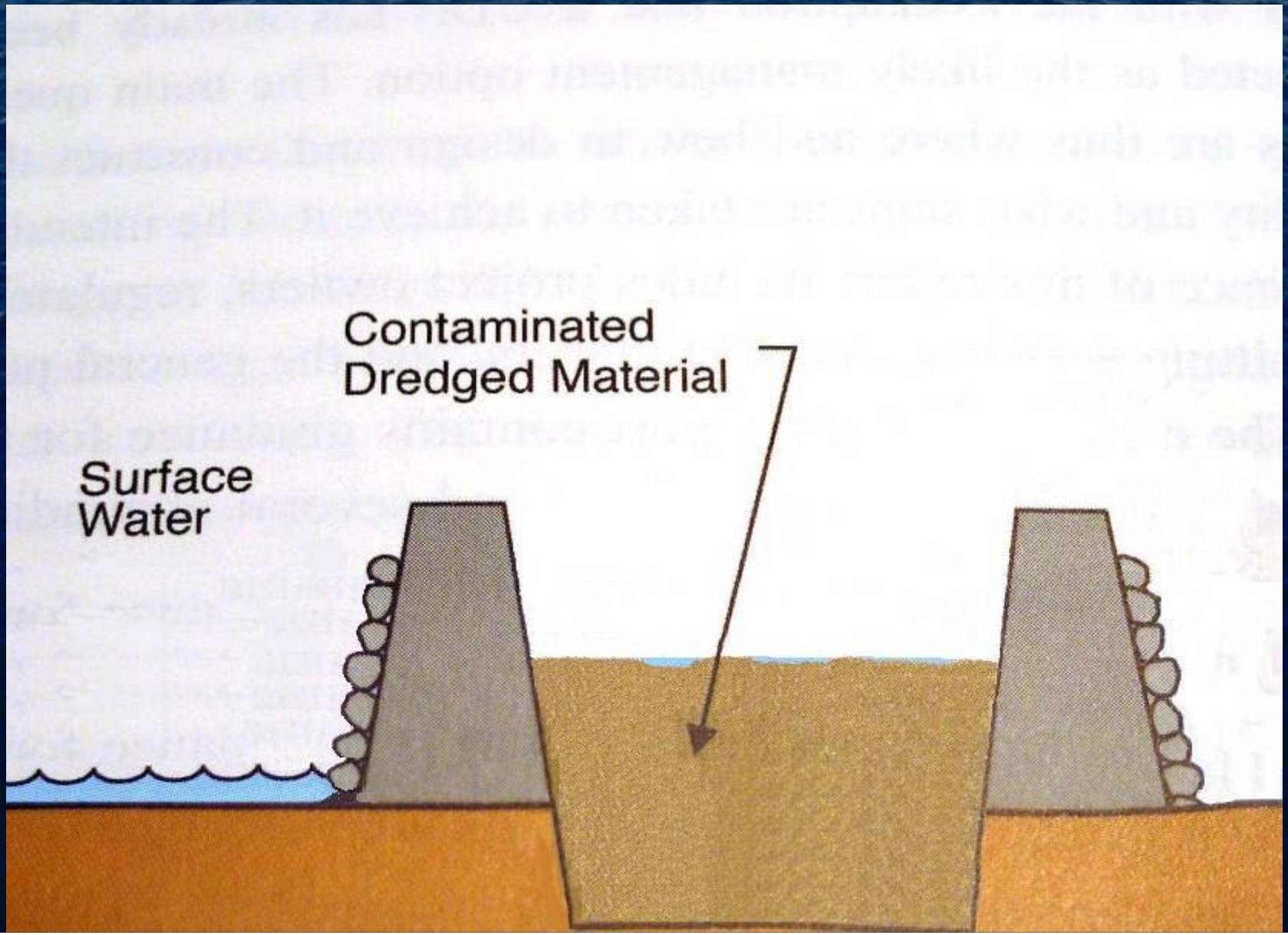
Layout 1987-2005: diked, subaquatic, near shore facility



Layout > 2005: nearshore / upland, “wet” design

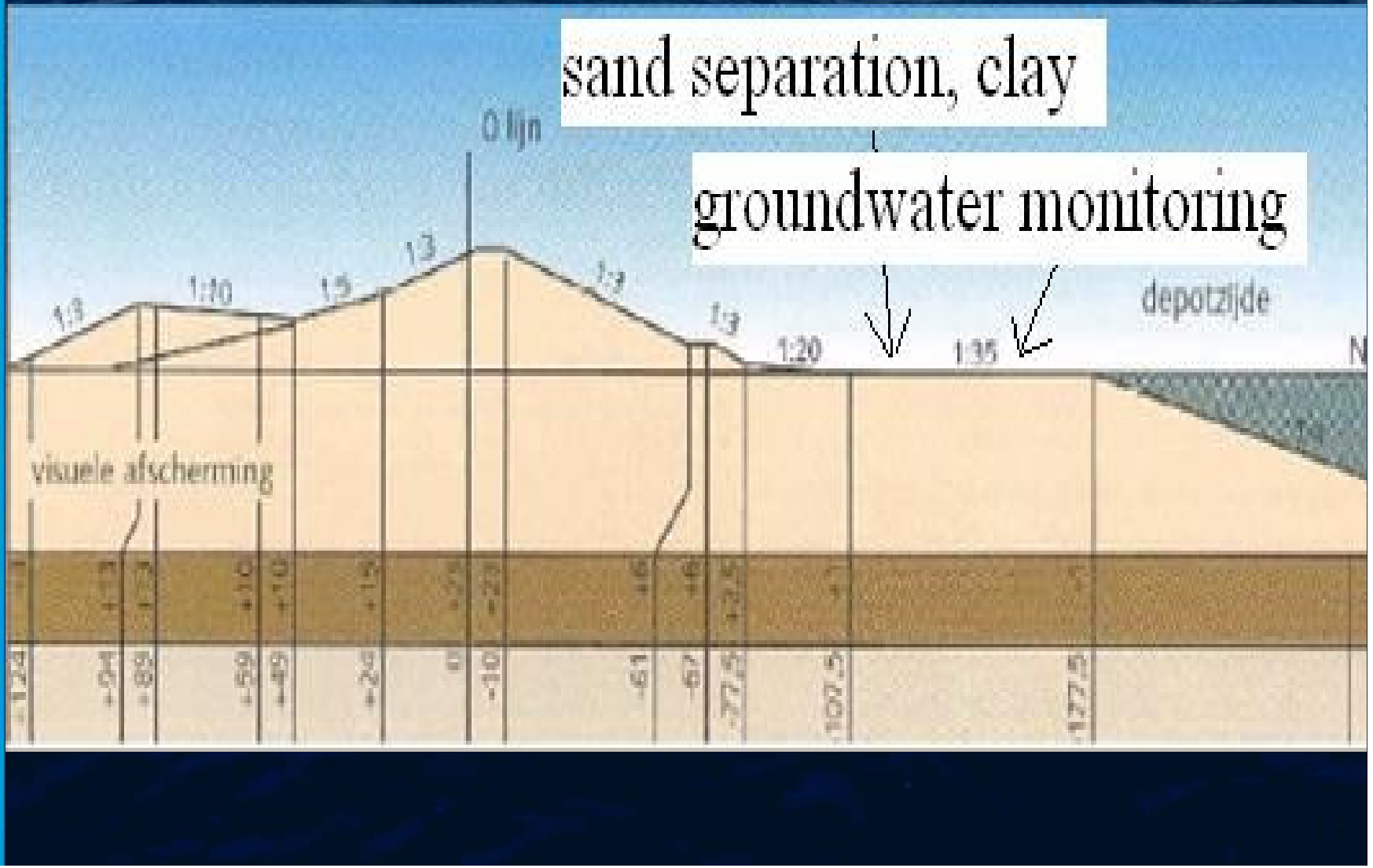


or “dry” design

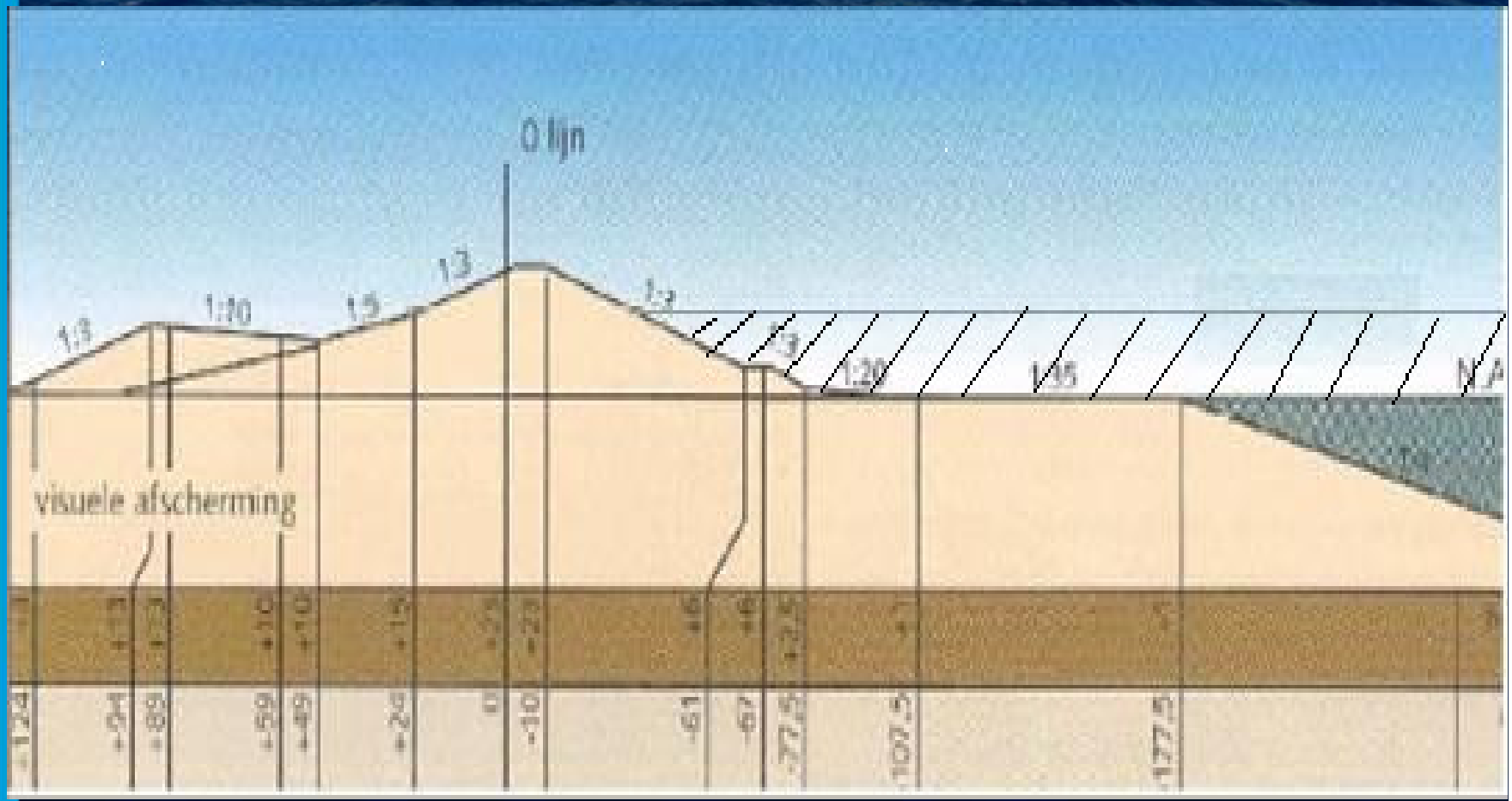


Aerial view of processing facilities on the “shoulder” on the inner side of the Slufter dike

Typical cross section of Slufter dyke



In the near future the shoulder of the dike can not be used anymore for treatment



Assessment of wet / dry layout of the Slufter (1)

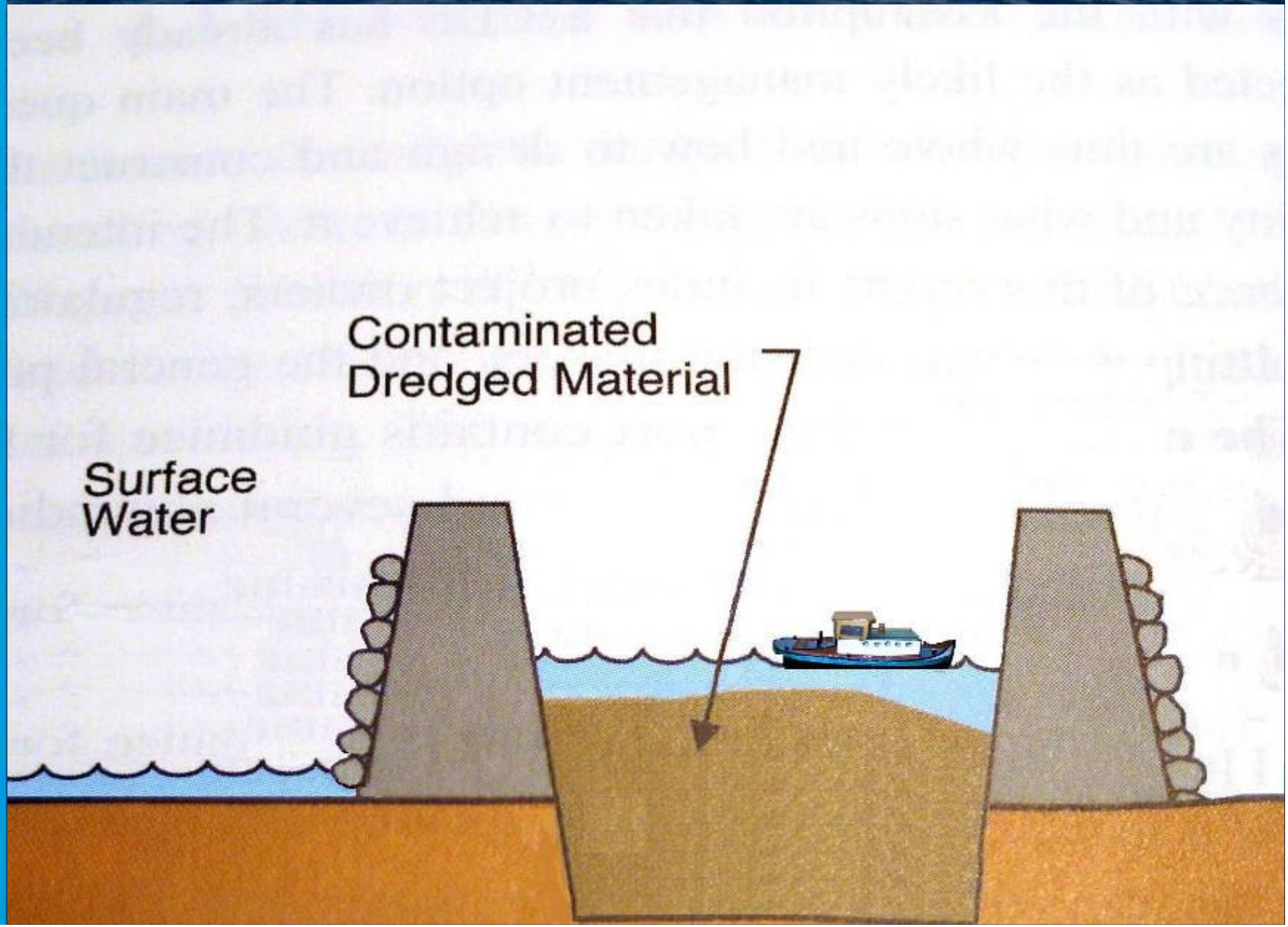
	DRY	WET
Discharge of effluent	-	+
Suspended matter content	-	+
Nitrogen content	-	+
Seepage through dike	+	-

Wet / dry layout of the Slufter (2)

	DRY	WET
Accessibility	-	+
Safety	-	+
Monitoring	-	+
Erosion (dike)	+	-
Smell	-	+
Dust	-	+

Accessibility of the Slufter, “dry” layout

Accessibility, navigable design

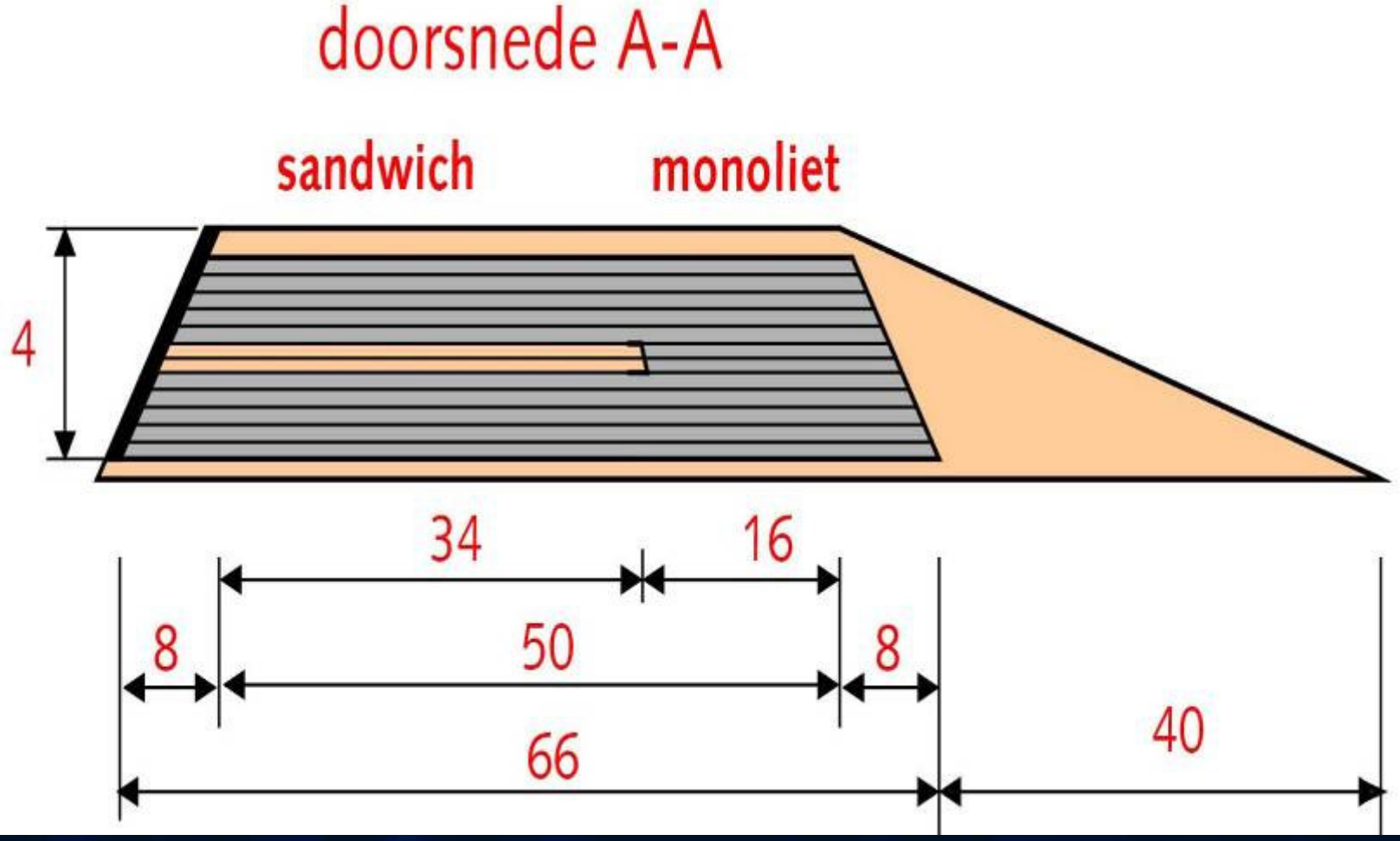


Protection of the dike

Treatment for benificial use of DM

	costs	Env. effects	Applicability	space	marketing
Sand separation	+	+	+	+/-	+
De-watering (Ripening)	+	+	+	-	+/-
Immobilisation	-	-	+	+	+/-

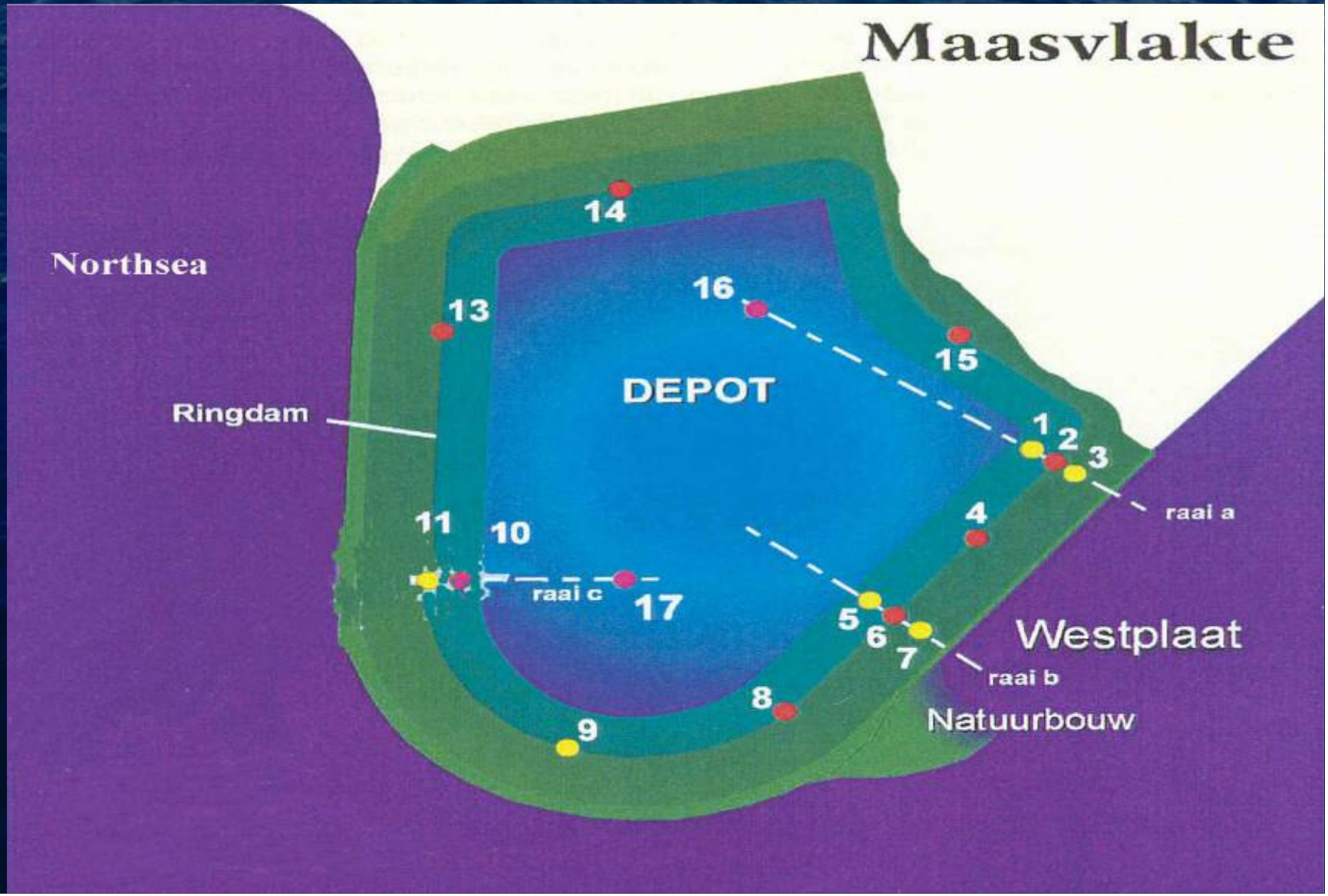
Sandwich construction



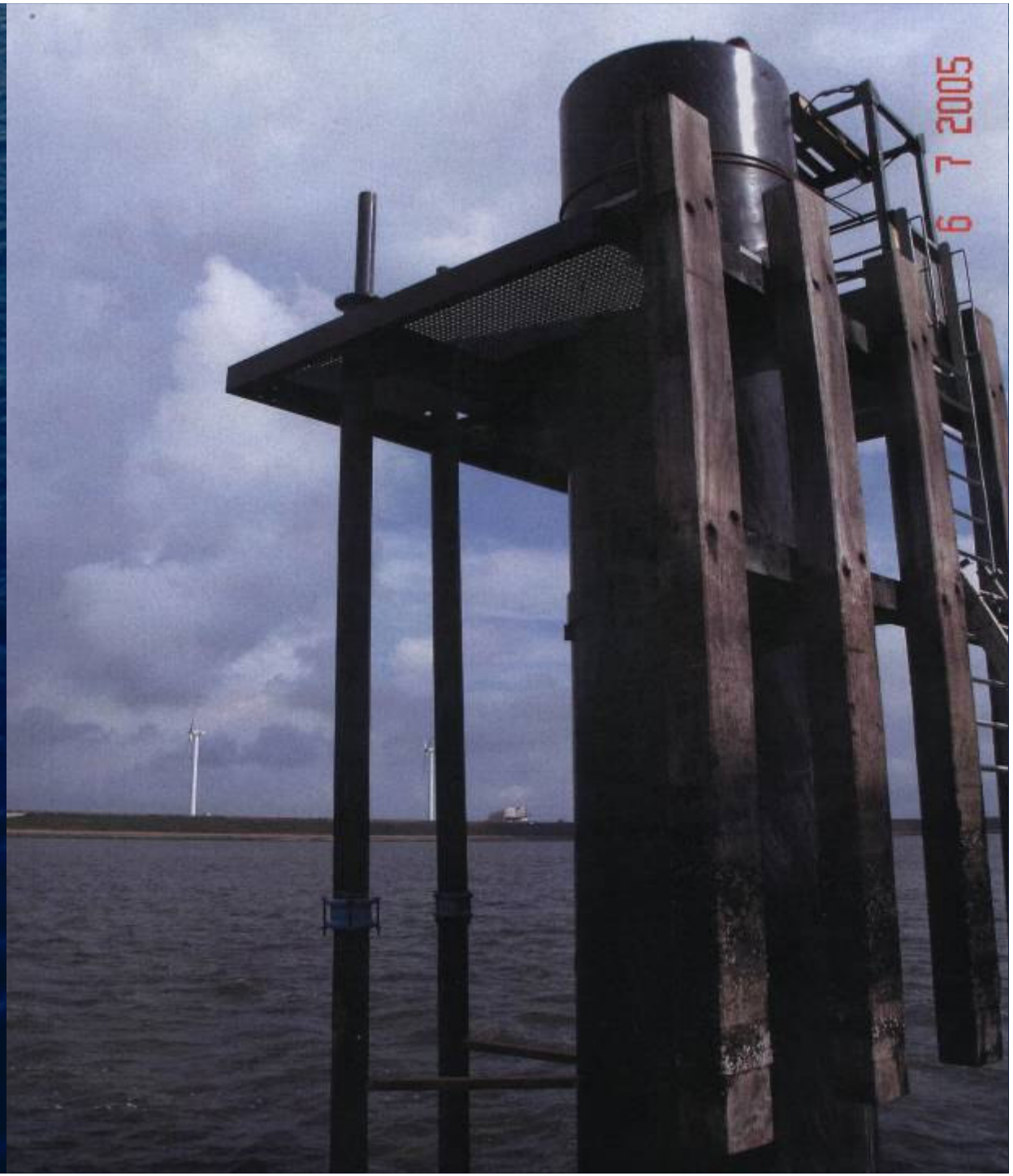
Sandwich construction

Treatment of DM outside the Slufter

Groundwater monitoring locations



Raised platform



Steered drilling for new groundwater well

Criteria for suitable effluent treatment technique

- Proven technology
- Robust
- Costs [€/m3]
- Efficiency (removal of suspended matter)
- Efficiency (nitrogen)
- Environmental efficiency
- Space

Treatment of effluent of the Slufter

- *Sedimentation in an improved sedimentation basin*
- Coagulation/ Flocculation
- Fine filtration
- Sand filtration
- Membrane filtration
- *Helofyten (reed) filtration*

Settlement basin near the Slufter

Improvement of the settlement basins

Recirculation basin for effluent (return water) of the Slufter

Other functions?

Stimulate or discourage?

Birds

- Dry parts in the Slufter are attractive as feeding and breeding areas for coastal breeding birds
- In 2002 tens of nests were lost when the waterlevel was raised
- Precondition: operational management should not be disturbed too much

NATURE DEVELOPMENT - BIRDS

- Stimulation of breeding birds in the Slufter
  - artificial islands +/-
  - *floating constructions ++*
- Breeding birds outside the Slufter
  - *Development of breeding facilities in undeveloped area +*

Bird island near the Slufter

Other functions: nature development

- nature development in and around the Slufter
  - fyto remediation (willows) +/-
  - helofyten filter (water purification) ++
  - optimalization of mowing regime dike ++

Other functions: energy production

Wind energy	++
Solar power	++
Biogas	-
Biomass	+/-

Windmills on Slufter dike

Conclusions (1)

- A layout with a water table of a few meters on the depot
- Measures to protect the dike against erosion
- An area of 10 ha is reserved outside the Slufter for treatment of DM
- The sedimentation basin for the effluent of the Slufter will be optimised, part of it will be transformed into a helofytenfilter.

Conclusions (2)

- The groundwater monitoring facilities have to be adapted
- When solar energy production is feasible, solar panels can be installed on the south slope of the dike.
- The feasibility of using floating constructions to attract breeding birds will be worked out in more detail.
- The mowing regime of the dike along the Slufter will be optimized (birds, butterflies and insects)