

# CEDA Sustainable Management of the Beneficial Use of Sediments



# Classification of function and application

Five major functions are here defined as "the Five R's":

1. **Raw Material:** substitution for virgin manufactured soil or building materials, such as tiles or aggregates.
2. **Remediation:** clean-up of contaminated sites, brownfields or closure of landfills and mines.
3. **Reclamation:** creating new, or expanding existing, land mainly for human/commercial development activities.
4. **Restoration:** creation of habitat to support aquatic organisms and wetlands to improve natural value.
5. **Resiliency:** shoreline nourishment and (dyke) reinforcement for defence against floods and extreme climatic events.

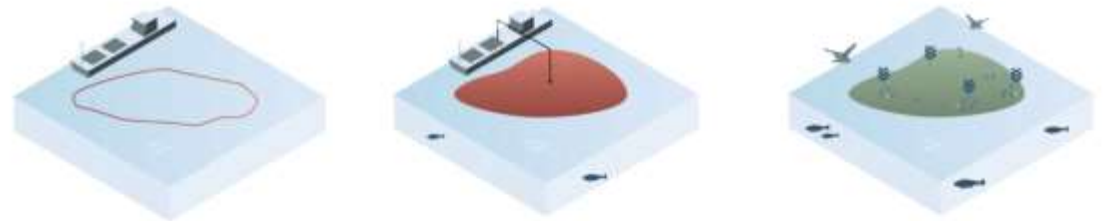
Furthermore, the various beneficial use applications can be divided into four broad techniques categorising the method used to implement the activity. These are:

- A. **On Land:** sediment is pumped and treated on land, such as drying/dewatering and ripening fields and dewatering plants (Figure 1).
- B. **In Water, reallocation at a final location:** sediment is transported and pumped, or deposited, at final locations, such as nourishments, land reclamation, waterfront redevelopment (Figure 2).
- C. **In Water, reallocated at a strategic location:** sediments are disposed at a strategic location, letting the local natural processes (e.g., hydrodynamic forces) transfer and trap the sediment at the final location, such as sand or mud engine (Figure 3).
- D. **In Water, enhancing trapping:** improving the trapping capacity of the natural system, for example strategic mangrove or wetland restoration projects (Figure 4). In this case

# Graphical presentation



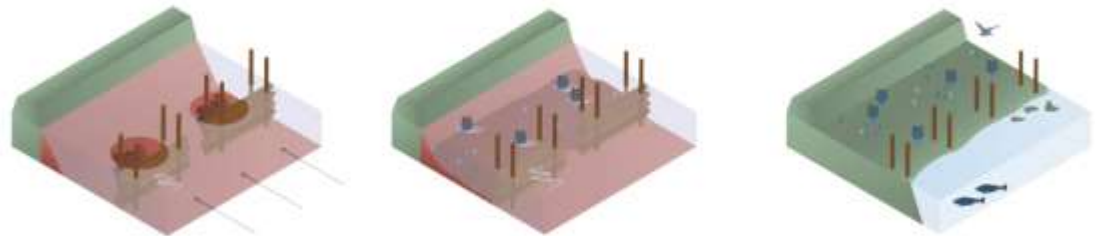
**Figure 1.** Sediment is deposited on land (in this illustrative case, in drying cells), possibly treated and reclaimed for other subsequent beneficial uses (in this case for dyke reinforcement).



**Figure 2.** Sediment is reallocated in water at the final location (in this illustrative case, an island with major function nature restoration).



**Figure 3.** Sediment is reallocated in water at a strategic location, Tidal flow and waves transport the sediment to the final location (in this illustrative case, for wetland restoration in front of a sea dyke, with consequential reduction of flood risk).



**Figure 4.** Trapping of sediment is enhanced (in this illustrative case, by permeable dams) to favour wetland restoration (in this case mangrove restoration).



# Case Studies – Format

## Case Study Beneficial Use of Sediments

<b>Project</b>	<i>Vlassenbroek / Dendermonde Dike</i>
Classification	<i>RSA_2005_BE</i>
Major Function	<i>Resiliency</i>
Other Functions	<i>Raw Material</i>
Location	<i>Vlassenbroek / Dendermonde, Belgium</i>
Volume	<i>2 x 100.000 (m<sup>3</sup>)</i>
Technique	<i>Stabilisation/solidification</i>
Contaminants	<i>None</i>
Granulometry	<i>Sandy loam</i>
Scale	<i>full scale</i>
Client	<i>Waterwegen en Zeekanaal</i>
Executor	<i>Consultant : n.a. ; Contractor: THV Jan De Nul - Envisan</i>
Research program	<i>European project PRISMA (Promoting Integrated Sediment Management)</i>
Contact	<i>Sofie Van Zele, Project Manager, Envisan, +32 53 73 16 52, sofie.vanzele@envisan.com Hans Quayhaegens, Project Manager, Waterwegen &amp; Zeekanaal NV, T (0)3 2246711, hans.quayhaegens@wenz.be</i>
Status	<i>Commercial</i>
Year Start – End	<i>2005 – 2014</i>

### Description of the project

As part of the Flemish flood protection program Sigma Plan, Waterwegen en Zeekanaal NV (W&Z) set up a pilot project in Dendermonde, involving the construction of a compartment dyke of a flood control area using dredged material from the river Scheldt without intermediate storage between the dredging and the construction process (which normally requires space, time and cost).

### Graphical information



Figure 1. Pumping installation



Figure 2. Mixing unit



Figure 3. Site view during works



Figure 4. Finished Compartment dyke

# Case Studies – where are the gaps?

**Table 1.** Case studies classified after Function (Rows) and Technique (Columns). Rows 1 through 5 refer to Function and columns A through D refer to Technique. Case study nomenclature includes a reference to the Function, Technique, the year at project start, and the country location of the project. Underlining indicates contamination present; Orange *italics* indicates treatment (see Position Paper for details on treatment techniques).

Technique → ↓ Function	A. On Land Natural or enhanced treatment	B. In Water Reallocation at final location	C. In Water Reallocation at strategic location	D. In Water Enhanced Trapping
1. Raw Material	<u>R1A_1985_DE</u> <u>R1A_1993_DE</u> <u>R1A_1996_DE</u> <u>R1A_2006_DE</u> <u>R1A_2006_NL</u> <u>R1A_2012_FR</u> <u>R1A_2015_US</u> <u>R1A_2017_IT</u> <u>R1A_2018_US</u>			
2. Remediation	<u>R2A_1988_DE</u> <u>R2A_1995_NL</u> <u>R2A_2015_DE</u>			
3. Reclamation	<u>R3A_2016_US</u> <u>R3A_2018_NL</u>	<u>R3B_2006_NZ</u> <u>R3B_2010_NO</u> <u>R3B_2018_SE</u>		
4. Restoration	<u>R4A_2010_NL</u>	<u>R4B_2002_US</u> <u>R4B_2005_US</u> <u>R4B_2008_US</u> <u>R4B_2016_NL</u> <u>R4B_2016_UK(a)</u> <u>R4B_2016_UK(b)</u>	<u>R4C_1999_NL</u> <u>R4C_2002_US</u> <u>R4C_2007_US</u> <u>R4C_2016_NL</u>	
5. Resiliency	<u>R5A_2004_DE</u> <u>R5A_2005_BE</u> <u>R5A_2013_FR</u> <u>R5A_2018_NL</u> <u>R5A_2019_BE</u>	<u>R5B_1990_UK</u> <u>R5B_2006_NL</u> <u>R5B_2010_US</u>	<u>R5C_2008_US</u>	<u>R5D_2015_ID</u>

## FUNCTION

- Raw Material
- Reclamation
- Remediation
- Resiliency
- Restoration

## TECHNIQUE

- In Water Enhanced Trapping
- In Water Reallocation at strategic location
- In Water Reallocation at final location
- On Land Natural or enhanced treatment

# Beneficial use of sediments: Case studies

## Introduction

These case studies were collected by members of the CEDA Working Group on the Beneficial Use of Sediments (WGBU)

[Read more](#)

[SUBMIT CASE STUDY →](#)



### LAND-BASED CONFINED DISPOSAL FACILITY TURNED INTO A NESTING AREA

through creation of islets and dikes from disposal facilities, Andalusia - ES



### PHYTOSTABILISATION: TECHNOSOL & BROWNFIELD BIOFUEL

through Phytoremediation, Stockton-on-Tees - UK



### COUNTER SUBSIDENCE AND CREATION OF NATURAL HABITAT

through strategic deposition, California - US