Dredging in the Port of Antwerp:

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Port of Antwerp

Port of Antwerp - intro

- North west Europe
- Distance to the sea: approximately 100 km

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Classic port activities:

– storage and transshipment

– petro chemistry

– container terminals

– 2 shipyards

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DREDGED MATERIAL

- **Source of dredged material**
- **Dredging techniques**
- **Disposal and/or processing techniques**

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1. Source of dredged material

1.1 Causes of sedimentation

1.2 Source of sedimentation

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1.1 Causes of sedimentation

Quantitative:

– **Carried down by streams and rivers:**

- (Soil erosion) + deposition caused by contact salty and fresh water: 80%
- Human activity: 19%
- Atmospheric deposition: 1%

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1.1 Causes of sedimentation

Quality negatively influenced by:

- Dumping or discharging (legal or illegal)
- Spillage from transhipment activities

Annual deposition: ~ 550,000 TDS

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1.2 Source of sedimentation

Fact: sediment accumulation
Cause: density flow

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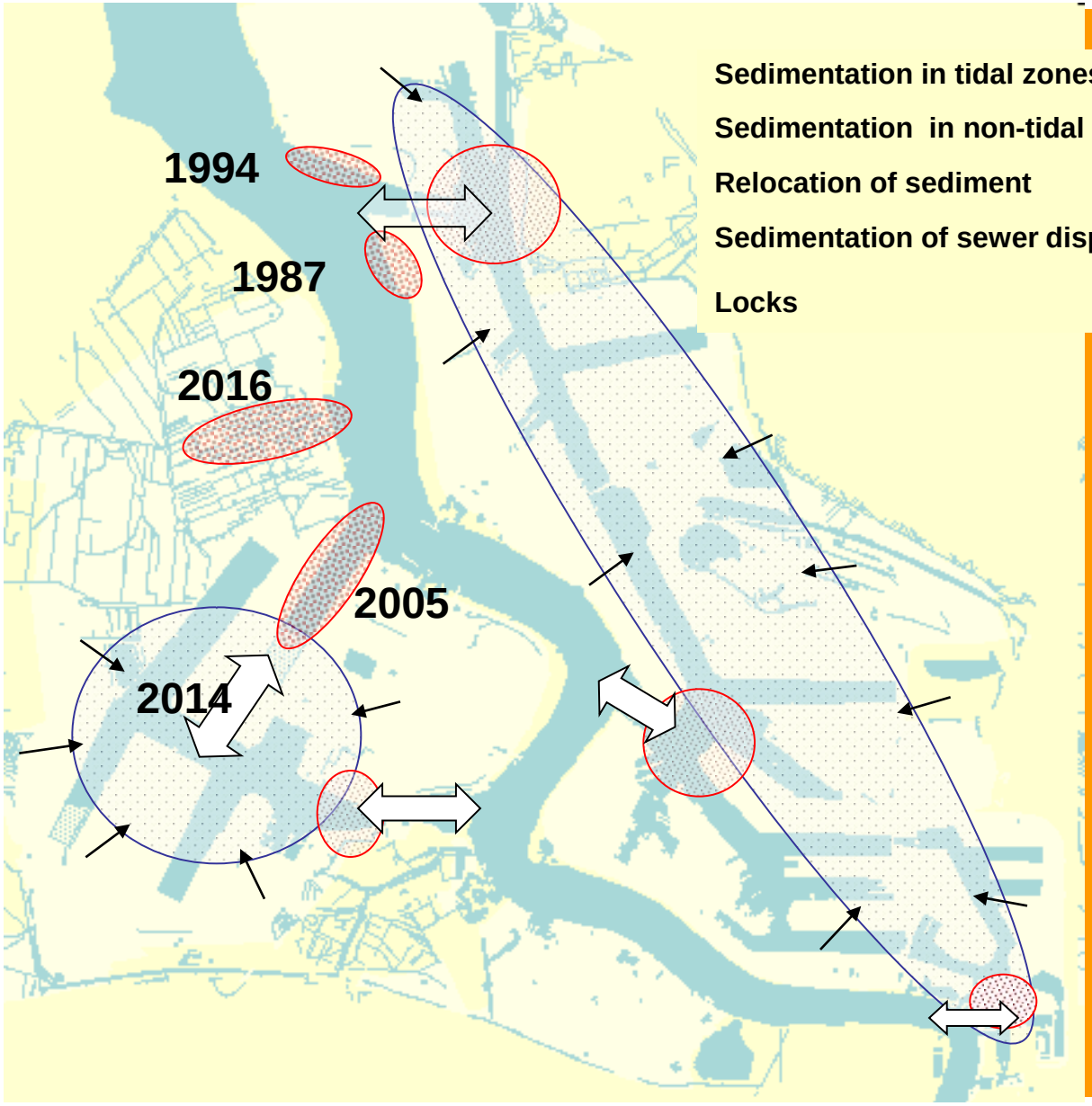
1.2 Source of sedimentation



Sedimentation in tidal zones

Sedimentation in non-tidal zones

Relocation of sediment

Sedimentation of sewer disposal and spillage

Locks

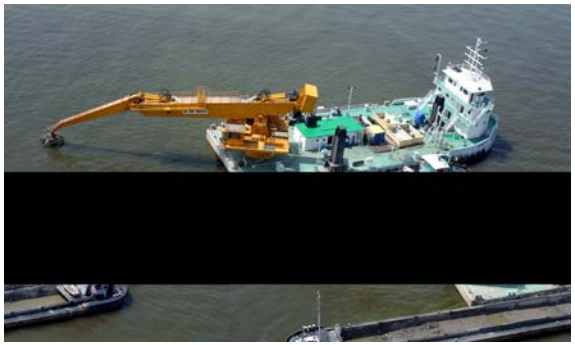
Sedimentation in the port of Antwerp

2. Dredging techniques

Operational dredging activities:

– river Scheldt: Flemish government

– docks: port authority with own fleet



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3. Techniques for disposal and processing of dredged material

3.1. Process

3.2. Current practice

3.3. Future practice - AMORAS

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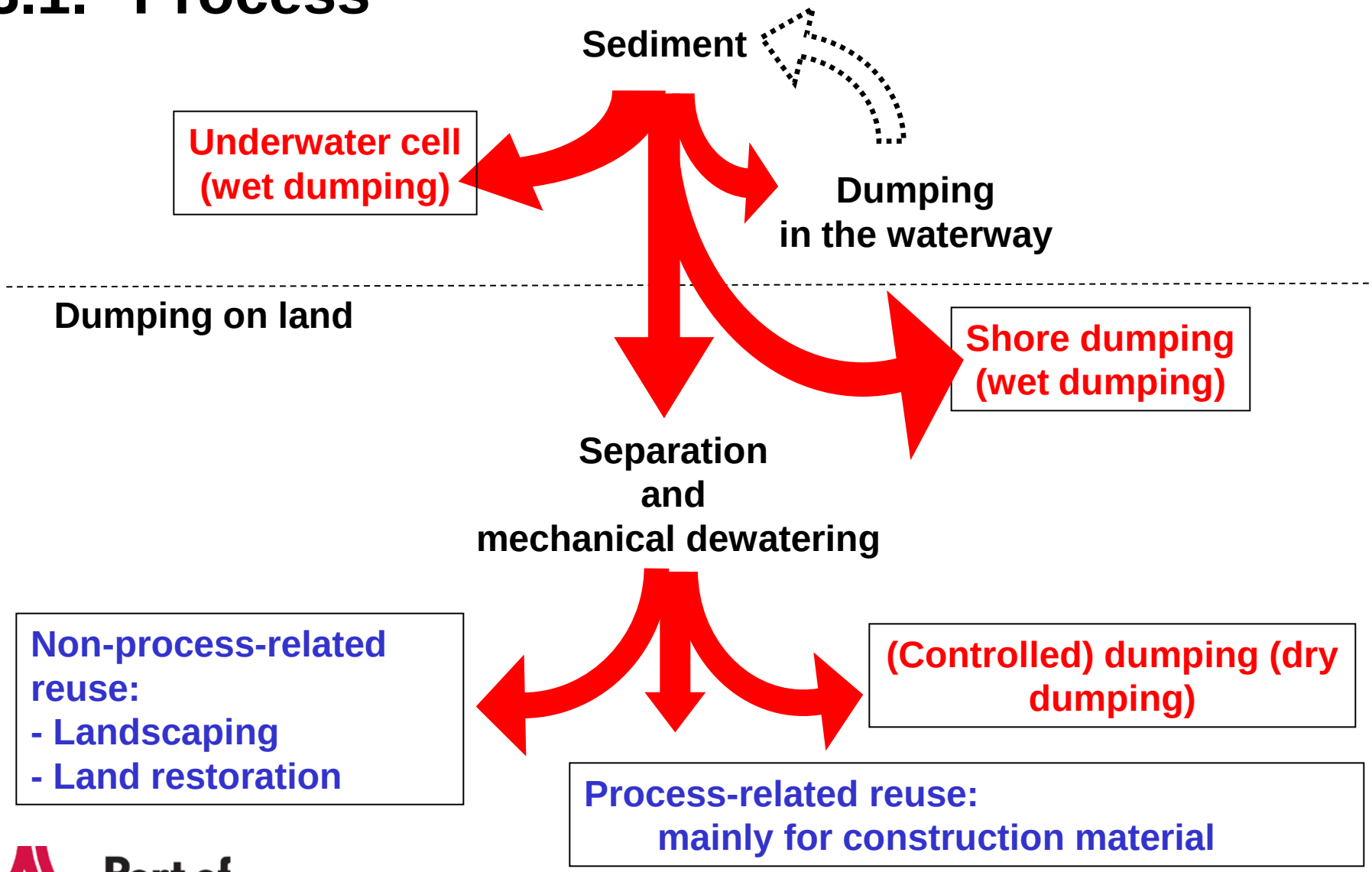
3.1. Process



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3.2. Current practice

3.2.1. Underwater dumping: underwater cell

=> "Less" polluted dredged material (complies with VLAREA criteria for reuse as construction material)

3.2.2. Dumping on land: shore dumping

=> "More" polluted spoil (complies with VLAREM II criteria for dumping sites)

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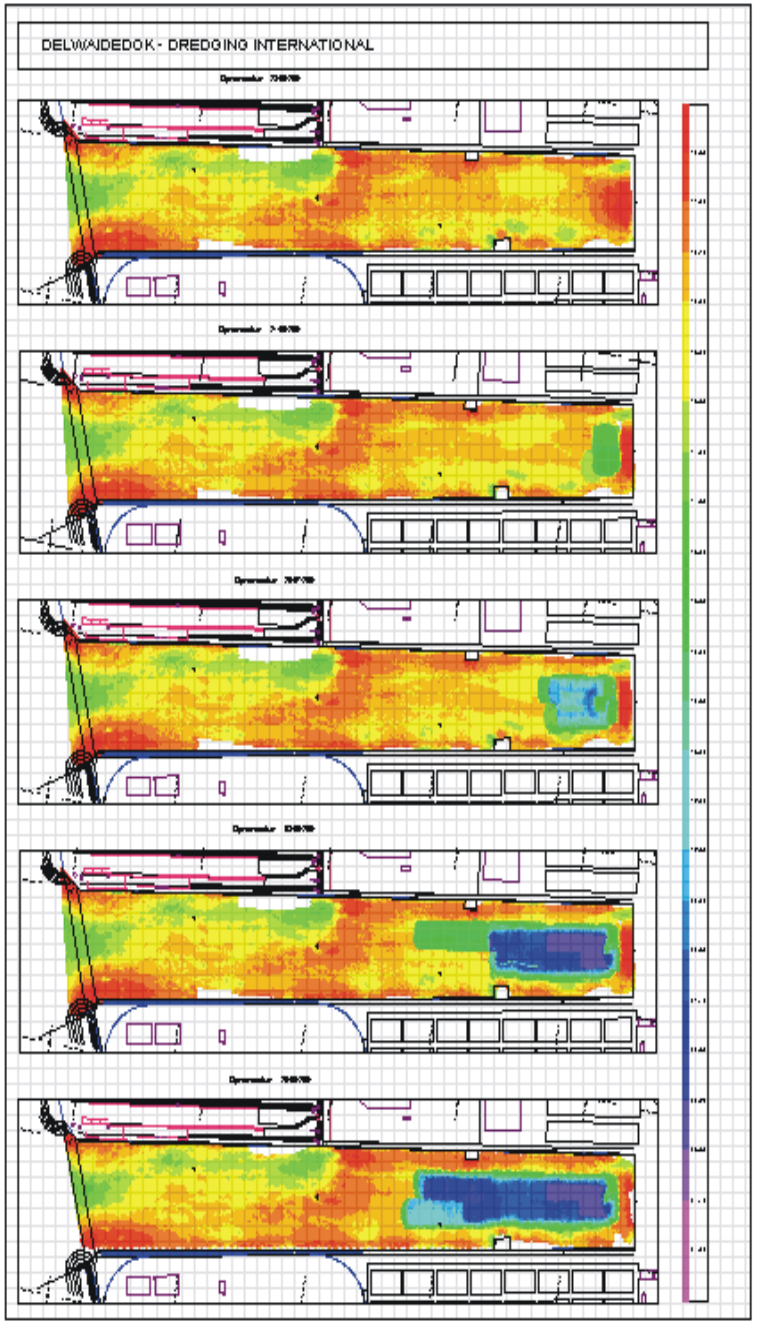
3.2.1. Dumping underwater

Delwaide dock underwater cell



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Delwaide dock underwater cell

2007	2006	2005	2004	2003

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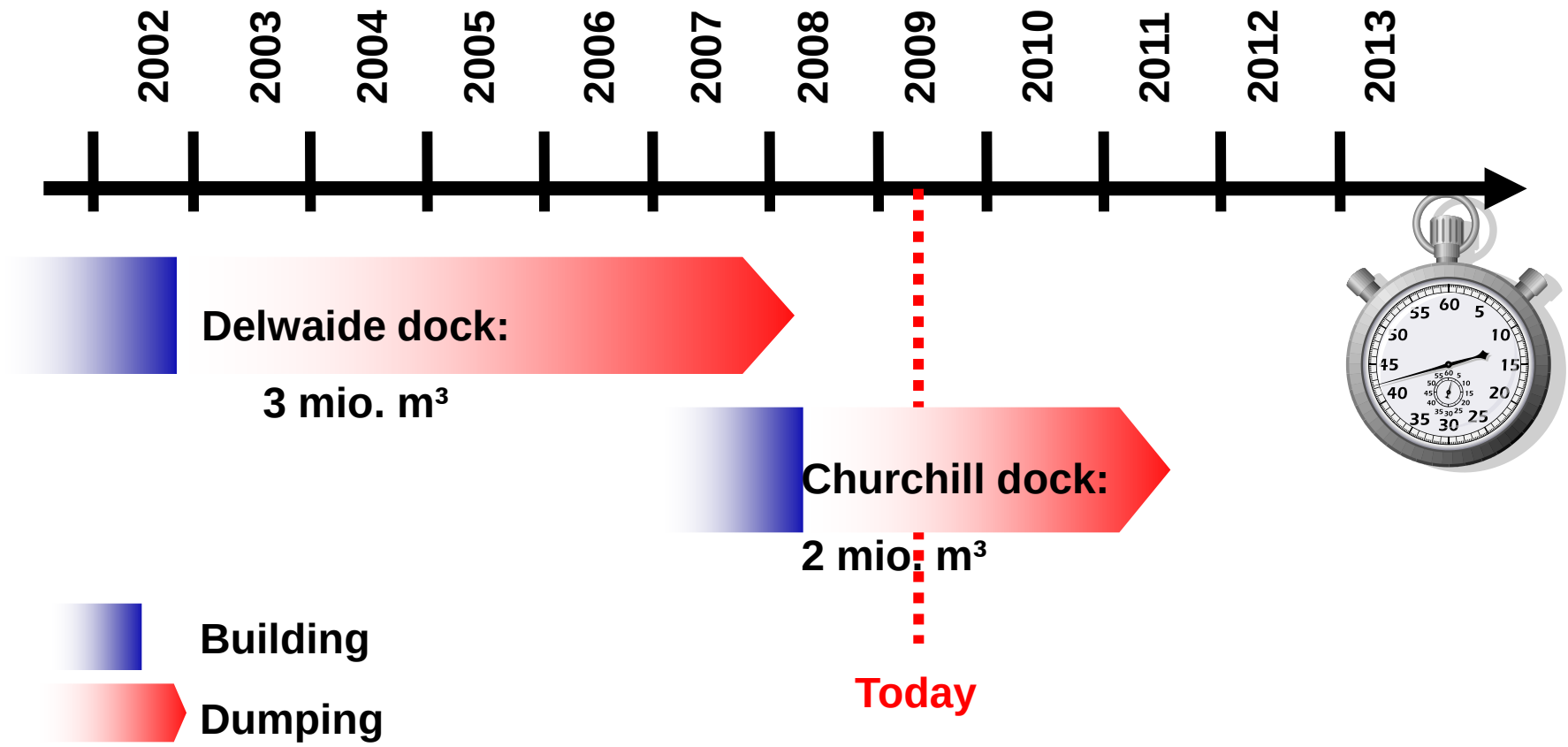
End: dumping in Delwaide dock underwater cell => Start: dumping in Churchill dock underwater cell



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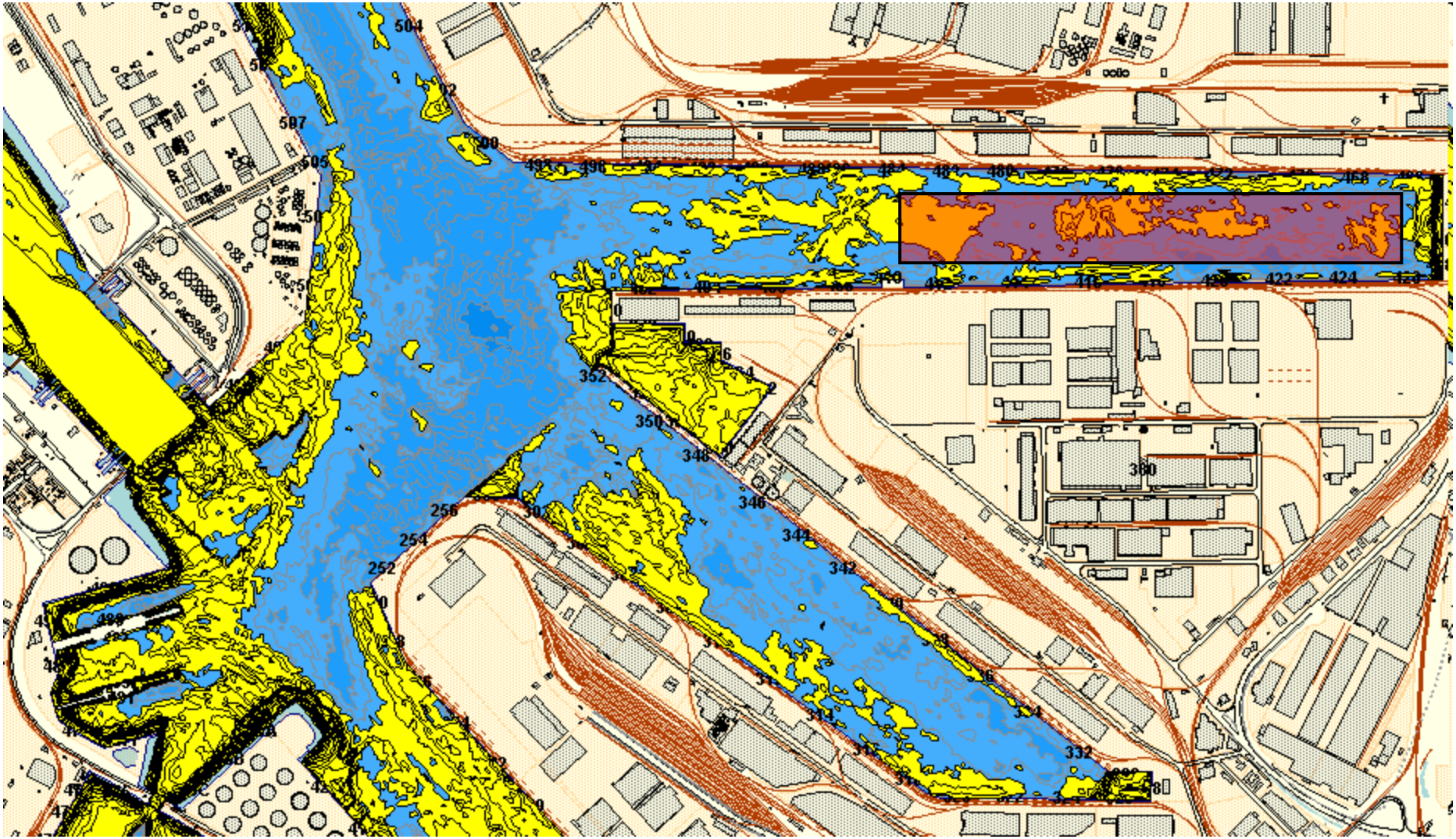
Interim solution: underwater cell Churchill dock



3.2.2. Dumping on land

Zandvliet shore dumping

Dumping cost:

approx. 3 €/m³ or 4.50 €/TDS

Capacity:

750,000 m³ or 500,000 TDS (shore dump 1a)

Environmental permit:

till April 2012

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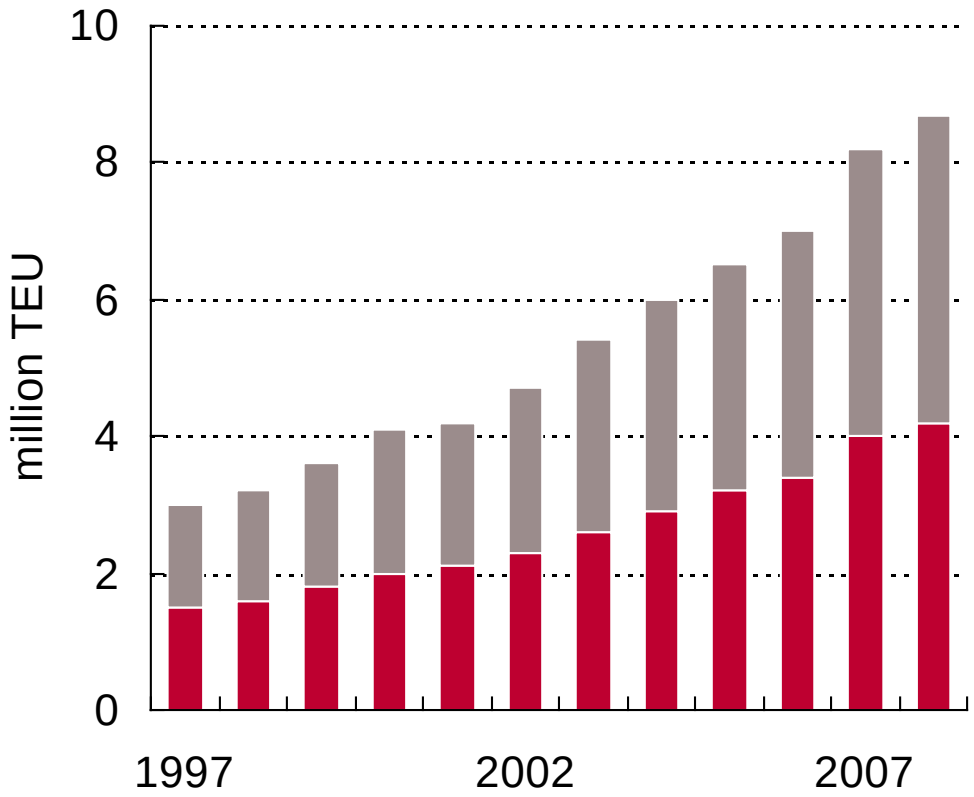
Maritieme container trafiek

- **Total volume: 8.7 million TEU**
- **Average annual growth: 9%**
- **Exceptional growth in 2007: 14%**



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Zandvliet shore dumping

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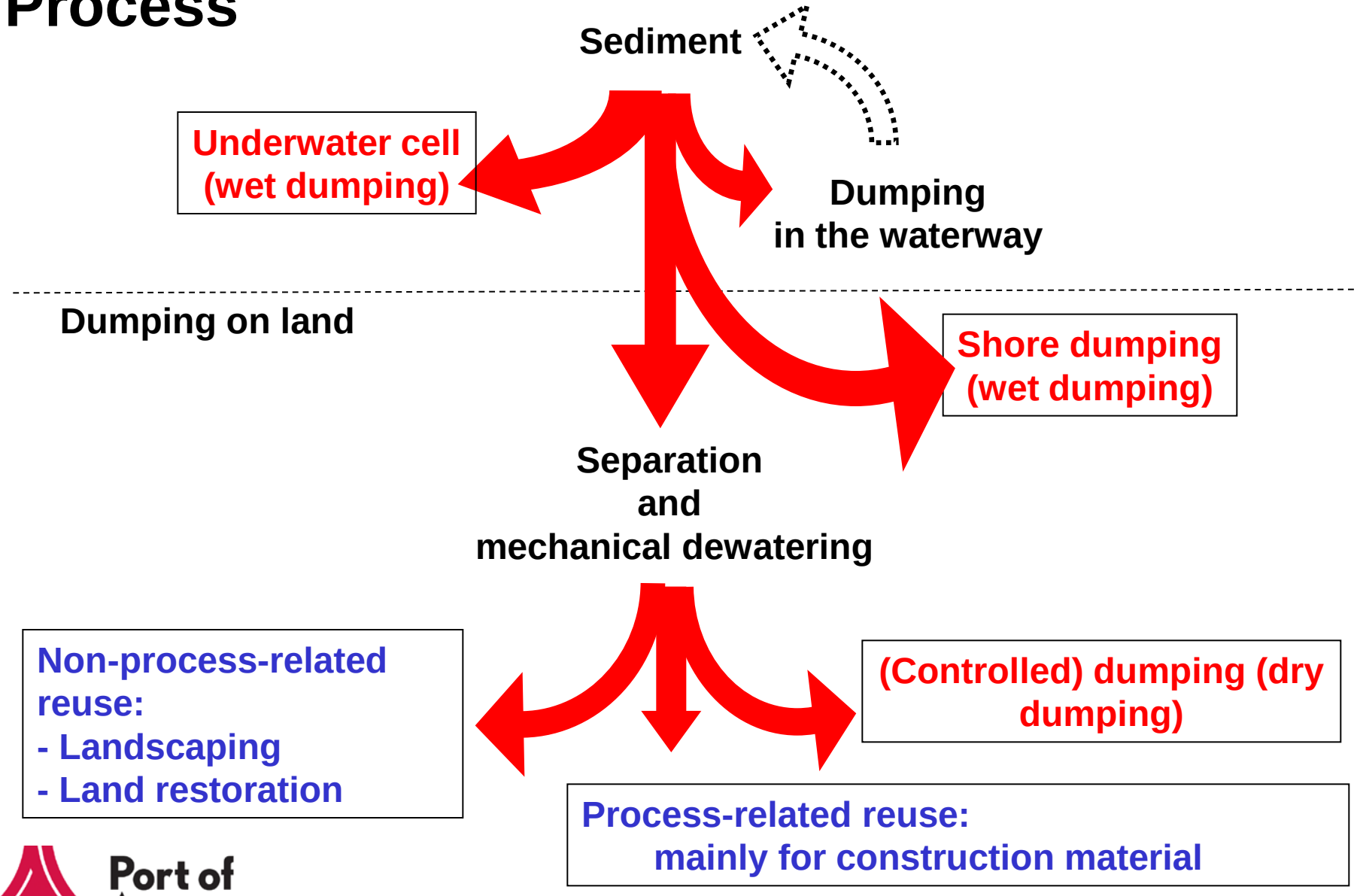
Process



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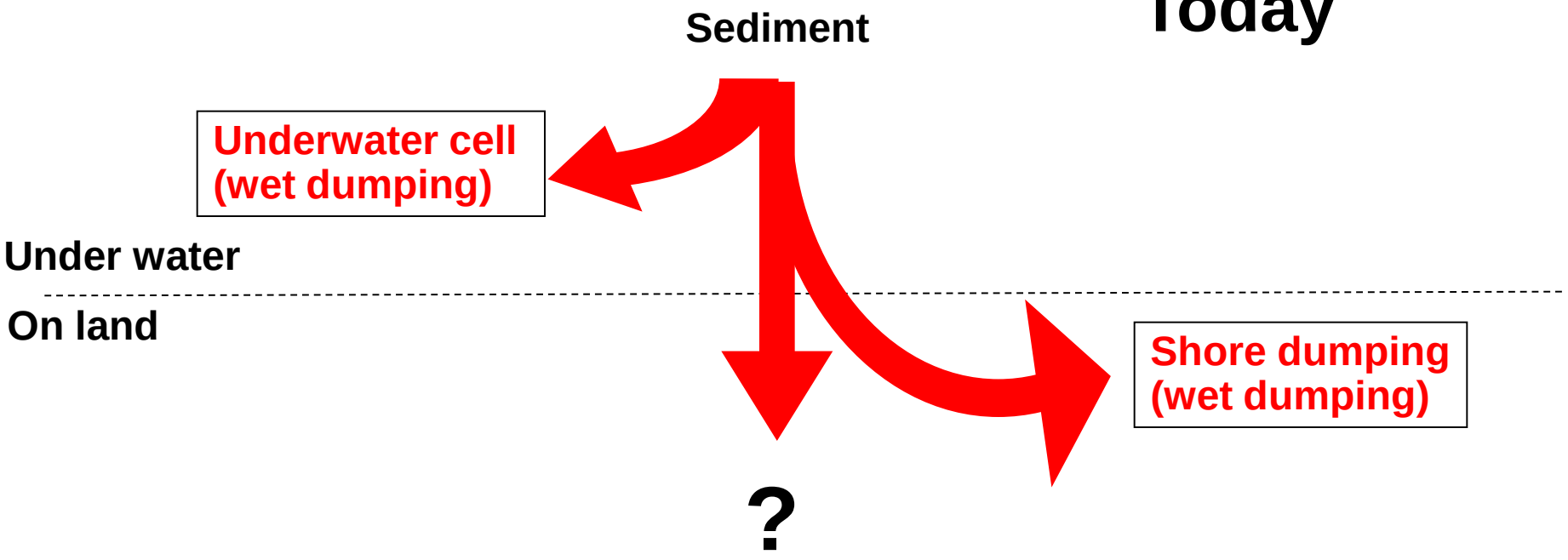
Today



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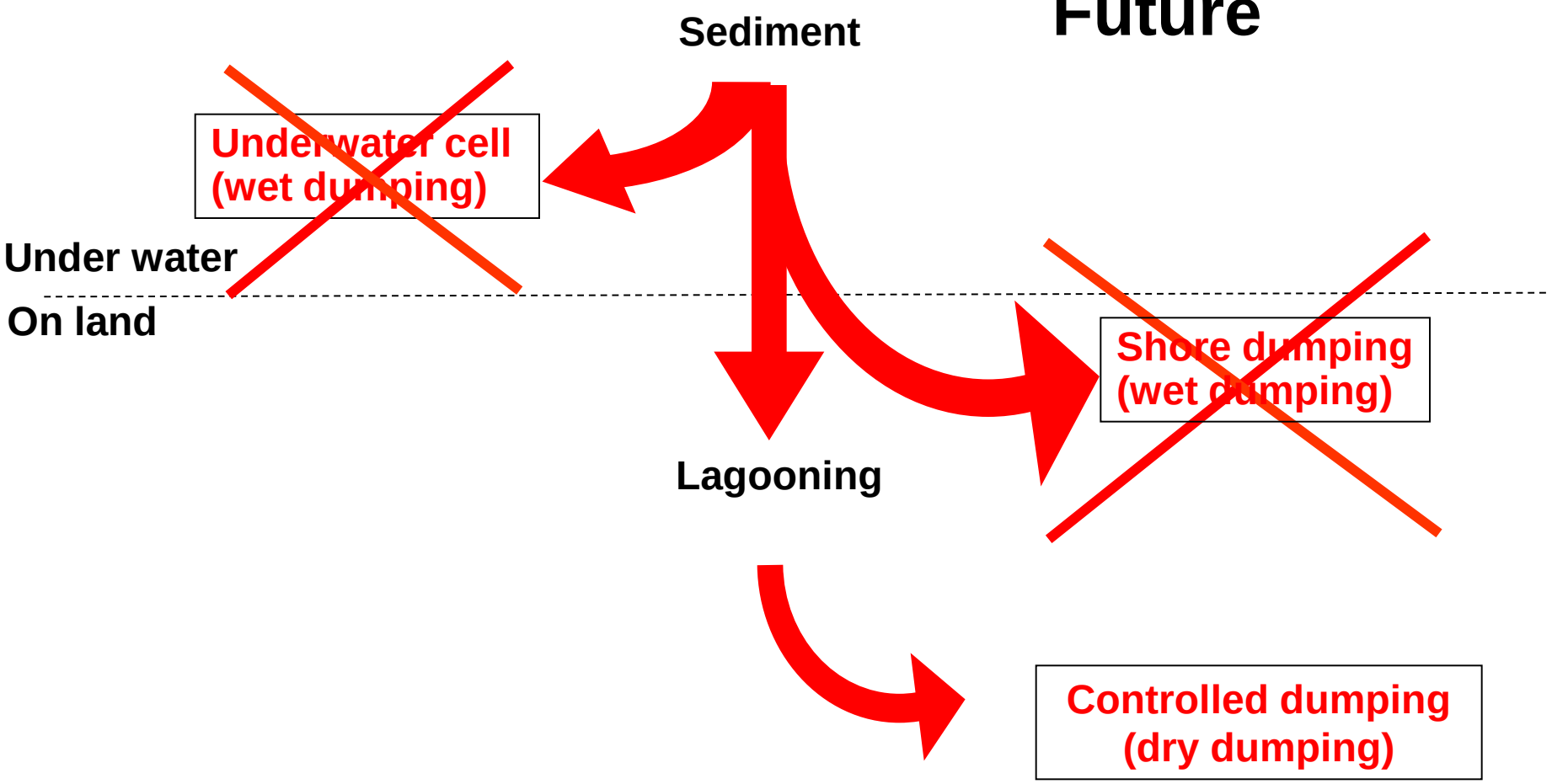
Future



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Exploitation versus expansion

3.3. Future practice: AMORAS

= Antwerp Mechanical Dewatering, Recycling & Application of Sludge

- **Pilot trials**
- **Flow chart**
- **The heart of the installation: the chamber filter press (= CFP)**
- **Practical implementation**
- **Useful application/reuse**

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1. Location

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Pipeline Route
30 ha
Sand Separation
Storage
20 ha
Underwater Cell
Dewatering

3.3.2. Process

Dredged Material Acceptance: Underwater cell + dredger

Sand Separation

Depending on the environmental quality and/or percentage of sandfraction

Thickening

4 pools with a content of 120.000 m^3 + a rotating arm

Dewatering

After thickening additives are added.
Dewater by means of 12 chamber filter presses (size 25x5x5m) (min 60% dry matter)

Storage

Filter cakes are stored in ‘Zandwinningsput’.
Capacity for min. 30 years (50m high).

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3.3.2. Proces

Some Important Numbers:

- Amount of dredged material to treat: 400.000 to 600.000 tons of dry matter/year
- Pump capacity booster pumps (dredged material from OWC to BIV): 3000m³/h
- Thickening pools: 4x120.000m³; outer radius of the thickening pools: 194m
- 12 filter presses: each with a content of 21,5m³ and with 193 plates of 2x2m

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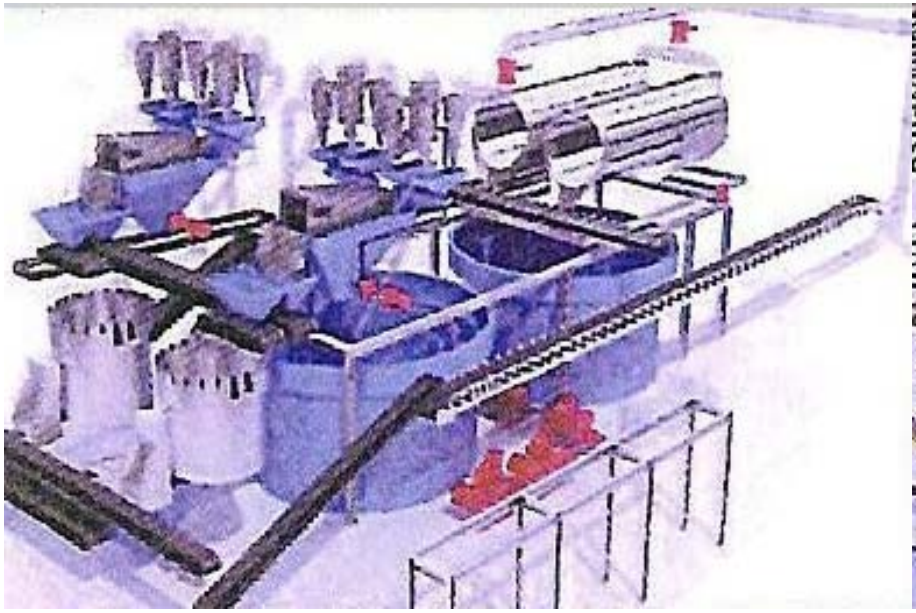

3.3.3. Environmental-Ecological Aspects

Environmental friendly installation:

- Water: low consumption and re-using
- Soil: use of films and drainage
- Air: treatment at the source – no disturbing smell (suction capacity: 200.000m³/h)
- Noise: closed buildings
- Studies about re-using the filter cakes

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3.3.3. Environmental-Ecological Aspects

Creation of a nature reserve:

- Compensation measures for disappearing of Zandwinnings
- In 2008 created Opstalvalleigebied phase 1:

  3 waterpools, 2 cane fields, 16m high buffer dam
- Montering in 2009: OK

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3.3.4. Cooperation

Partners:

Opdrachtgever: Vlaamse Overheid
Departement Mobiliteit en Openbare Werken
Afdeling Maritieme Toegang

Stakeholder:
Gemeentelijk Havenbedrijf Antwerpen

Aannemer:

THV Jan De Nul - Dredging International
(DEME), Envisan en DEC

SeReAnt Tijdelijke Handelsvereniging

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3.3.4. Cooperation

Partners:

Engineering studies office :

- TV MWH – Seghers Keppel

Safety Coordination:

- Coor nv

Storage Specialist:

- Bova M.C. nv

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3.3.5. Finances

Assigned amount: 482 million €
(incl. VAT, construction costs, finance costs, exploitation costs)

- Phase 1 Construction:
  118 million € (incl. VAT)

- Phase 2 Exploitation
  27 million € / yr. (incl. VAT)
  (of which 5 million € /year financing)

www.amoras.be

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