AMORAS: project presentation

Freddy Aerts
Head of Division – Maritime Access
17-04-2013

28/03/2012
Table of contents

- Maritime access

- Project AMORAS
  - Scope
  - Planning & Finance
  - Contractors

- Phase 1 : Design & Build
  - Under water cell (storage) & dredging equipment
  - Sand separation
  - Supply line
  - Consolidation ponds
  - Dewatering plant
  - Water purification plant
  - Storage area

- Phase 2 : Exploitation
  - VAMORAS
Division ‘maritime access’
Division ‘maritime access’

• Maintenance dredging North Sea + coastal ports (Zeebrugge, Oostende)
• Maintenance dredging river Scheldt + port of Antwerp
Division ‘maritime access’

• Construction and maintenance of the basic infrastructure (locks, breakwaters, access roads) of the Belgian Seaports (Antwerp, Ghent, Oostende en Zeebrugge)
The largest lock in the world
- October 2011 – March 2016
- Dimensions: 500m x 68m x -17.80m
- Cost price: € 382 mio
Project AMORAS
Project Scope - need

Siltation tidal zones

Siltation non-tidal zones

Shallowing as result of internal Displacements

Siltation from sewer discharges

What to do with the siltage in the Port of Antwerp?

28/03/2012
Project Scope

‘Under water cells’: extra depths, in the bottom of the docks

Disposal sites in the port area

28/03/2012
**Project Scope**

- **Project purpose**: Sustainable solution for the dredged material from the Port of Antwerp
  - Mechanical dewatering of the sludge
  - Storage under ‘controlled conditions’
  - Capacity of 600,000 tonnes of dry matter/y

- **AMORAS**: Antwerp Mechanical Dewatering, Recycling and Application of Sludge
Project Scope: Location

Situating AMORAS
Project Scope - Geography

- Under water cell & sand separation
- Storage
- Dewatering & waterpurification plant

28/03/2012
Project Planning
Project Finance

- Turnover phase 1
  Design + Build + Test phase  approx. 120 mio €

- Turnover phase 2
  Exploitation full installation  (22 mio/Yr) 330 mio €

- Financing  approx. 35 mio €

- Total project value:  approx. 485 mio €
Project - contractors

The temporary trade association SeReAnt is a combination of Flemish dredging company Jan De Nul and Dredging International (DEME), supported by their respective environmental contractors Envisan and DEC.
Phase 1: design & build
Phase 1: design & build
under water cell (UWC)

facts & figures

Storage capacity: 300,000 m³
Storage only for less contaminated sediments
Dredging spoil that may be contaminated is taken immediately to the quay.
Phase 1: design & build
dredging equipment
detailed design – 3D
Phase 1: design & build

dredging equipment

final
Phase 1: design & build

dredging equipment

facts & figures

• Type = cutter suction dredger
• Electrical power 1.8MW
• Dredging capacity = 3000 m³/h
• Dry matter content of dredged material = +/- 20%
• Dredging depth = -18m
Phase 1: design & build
sand separation
detailed design
Phase 1: design & build
sand separation
present
Phase 1: design & build
sand separation
facts & figures

- 2 parallel installations
- Capacity per installation = 1500 m³/h
- Coarse separation through sieve drums up to 8mm
- Sand separation through hydrocyclones (> 63 µm)
- Sand washing is possible using upstream classifiers
- Bypass of sand separation unit
Phase 1: design & build

supply line

basic design (offer)
Phase 1: design & build

supply line present
Phase 1: design & build

Supply line
facts & figures

• Start point: booster pumps from the sand separation plant
• End point: central point at the consolidation ponds at the Bietenveld
• Distance: approx. 4 km
• 2 supply lines for dredged material and 1 discharge line for the transport water
Phase 1: design & build
Consolidation ponds
basic design (offer)
Phase 1: design & build
Consolidation ponds construction
Phase 1: design & build

Consolidation ponds present
Phase 1: design & build
Consolidation ponds

facts & figures

• 4 consolidation ponds with a useful content of 120,000m³ each
• 3 ponds for “less contaminated sediments”
  1 pond for “more contaminated sediments”
• Round shaped, with 4 quadrants
• Each quadrant is covered with HDPE liner
Phase 1: design & build

Rotating Gantry

basic design (offer)
Phase 1: design & build

Rotating Gantry
detailed design
Phase 1: design & build

Rotating Gantry

present
Phase 1: design & build
Rotating Gantry
facts & figures

• Movable span of approx. 180m
• Rotation speed = approx. 4h/360°
• 2 dredging pumps (movable over the radius axis)
• Capacity dredging pump = 600 m³/h per pump
• Dry matter content of pumped sediments = 20-25%
Phase 1: design & build
Dewatering plant
basic design (offer)
Phase 1: design & build
Dewatering plant
present
Phase 1: design & build

Dewatering plant

present
Phase 1: design & build
Dewatering plant
facts & figures

- 12 membrane chamber filter presses for 600,000 TDM/year, fed from 1 central buffer
- Production plant lime milk
- Production plant PE-solution
- Odour control unit (2 scrubbers)
- Test hall
- Laboratory
- Dimensions (length x width x height): approx. 150m x 60m x 20m
Phase 1: design & build

Dewatering plant- filterpresses construction
Phase 1: design & build

Dewatering plant - filterpresses present
Phase 1: design & build water treatment plant construction
Phase 1: design & build water treatment plant

facts & figures

• Purification of process water to discharge standards
• 2 independent lines
• Total capacity = 252m³/h
• Physical-chemical pre treatment
• Biological post treatment for the removal of organic material and N
• Purified water is reused in the process and discharged in the Kanaaldok
Phase 1: design & build
Deposit site (landfill)
basic design
Phase 1: design & build
Deposit site (landfill)
geography
Phase 1: design & build
Deposit site (landfill)

facts & figures

- Location: “Zandwinningsput”
- Area: approx. 35 hectares
- Filter cakes are stored on top of 10 meter moderately consolidated sediments
- 2 landfill cells provided; zone “more/less contaminated filter cakes”
- Storage capacity: approx. 30 years
Phase 2: Exploitation
Phase 2: Exploitation

• Start date: 1 October 2011
• Duration phase 2: 15 years
• Stringent process guaranties
• Recycling of dredged material?
Phase 2: Exploitation Recycling of dredged material

- VAMORAS – Research project
  Investigate the extent to which the waste material/filter cakes can be reused.
- Filter cakes as material for clay granules, for bricks or road construction?
VAMOraS
Valorisation of mechanically dewatered sediment

- Link with AMORAS
- Goals
- Partners
- Possible bottlenecks for reuse
- Current state
- Statement
VAMOras
Link with AMORAS

- A flexible installation
- A well monitored process
- Result = filtercakes = an alternative raw material

Possibilities of AMORAS

Demands for reuse

Light weight aggregates
Concrete & mortar (filler)
Bricks
Infrastructure (bulk use)
VAMOraS

Goals

10% substitution of natural clay for bricks

10% – … substitution of natural clay for light weight aggregates

Use as filler (fine fraction, 95+% dry matter) for concrete & mortar
Calcination (mineralogical composition)

Bulk use in infrastructure works
VAMOraS
Partners

Coordination of project
Flemish Region – MOW, dept Maritime Access
Antwerp Port Authority

Research institutes
VITO - Flemish Institute for technologic research
OCW – research center for road construction
WTCB – scientific - technical center for the construction sector

Companies
Argex (lightweight aggregates)
De Rycke (concrete)
Wienerberger (bricks)

Subsidized by
IWT – Institute for Science & Technology
MIP – Platform for Environmental Innovation
VAMOraS
Possible bottlenecks for reuse

- Pollution in the sediment
- Unusable and unadjustable physical properties
- Economic feasibility
- Markets for recycled products – certification
- Regulation (permits, waste & materials legislation)
Bricks
Aggregates
Filler
Bulk use
The waste of today is the raw material of tomorrow.

Therefore the industry of materials has to be aware and start to act in this way.

On this matter a sustainable long-term solution for dredged sediment is feasible.
Thank you for your attention.

- www.amoras.be
- www.deurganckdoksluis.be