



Nature Based Solutions for Mine Tailings

Guido van de Coterlet

Ellen Verboom



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Presenters and Organization

Presenters and Organization

Presenters

Guido van de Coterlet

- Project manager of international environmental projects at TAUW bv
- MSc in Applied Physical Geography from Vrije Universiteit Amsterdam & MSc in Applied Marine Science from Plymouth (UK)
- Over 17 years of professional experience with the investigation, development of conceptual site models, risk assessment and remediation design of contamination projects including uncontrolled landfill sites, waste dumps and chemical factories.



Ellen Verboom

- Project engineer of international environmental projects at TAUW bv
- BSc in Natural Environmental Sciences from Utrecht University and MSc in Biology and Chemistry of Soil and Water from Wageningen University and Research
- Experience with site investigation and remediation design for contaminated sites



Presenters and Organization

TAUW bv

- European Environmental Engineering and Consulting company
- Founded in Haarlem, The Netherlands, on October 13, 1928
- Technisch Adviesbureau van de Unie van Waterschapsbonden
- 1960s; TAUW expanded and added engineering consultancy to its portfolio
- 1980s: TAUW became a leading company in contaminated site assessment
- TAUW is a proud employee-owned company



Nature Based Solutions by TAUW bv

Site Remediation

- TAUW bv has decades of experience in in-situ and ex-situ remediation of contaminated sites
- Both conventional, in-situ as well as nature based solutions (NBS)
- Traditional NBS (e.g. phytoremediation), but also more innovative NBS



Figure: Remediation of Volgermeer Dumpsite





Nature Based Solutions by TAUW bv

Practical Examples

Nature Based Solutions by TAUW bv

Reactive mat for biosorption

- Polluted canal near Ghent, next to an old asphalt factory Belgium
- Pollution with aliphatic and aromatic hydrocarbon
- Reactive mat with biochar and peat
- Reduction in pollutants of 85 to 100%
- Replacement every 10 years



Nature Based Solutions by TAUW bv

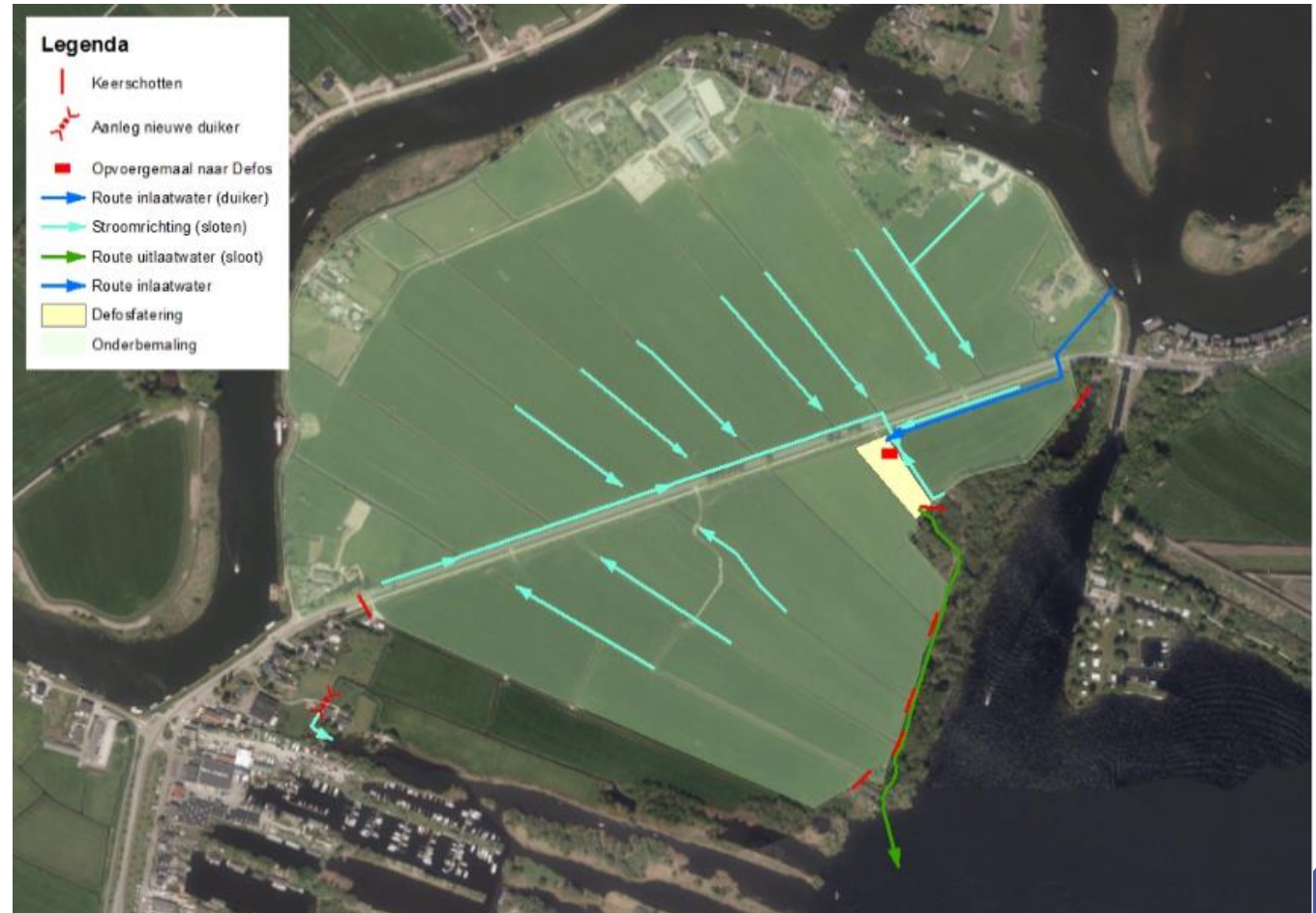
Reactive mat for biosorption



Nature Based Solutions by TAUW bv

Iron-oxide coated sand filter

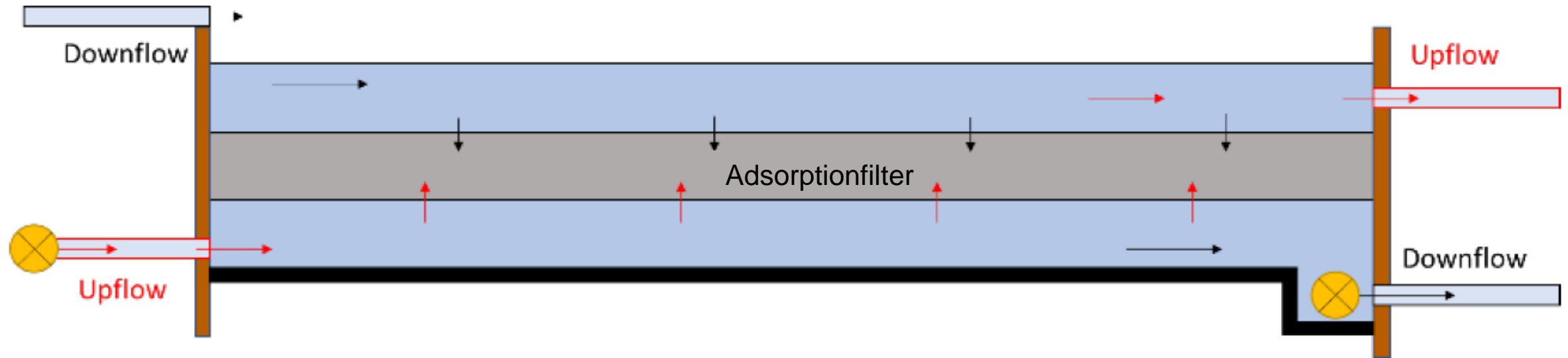
- Polluted lake Spiegelglas, the Netherlands
- Pollution with high phosphorus levels from agricultural soils
- IOCS filter between inflow from river Vecht and Spiegelglas
- IOCS = waste material from deferrization of drinking water
- 93% removal of phosphorus load



Nature Based Solutions by TAUW bv

Iron-oxide coated sand filter

- Waterflow through filter → Two possible directions



Nature Based Solutions by TAUW bv

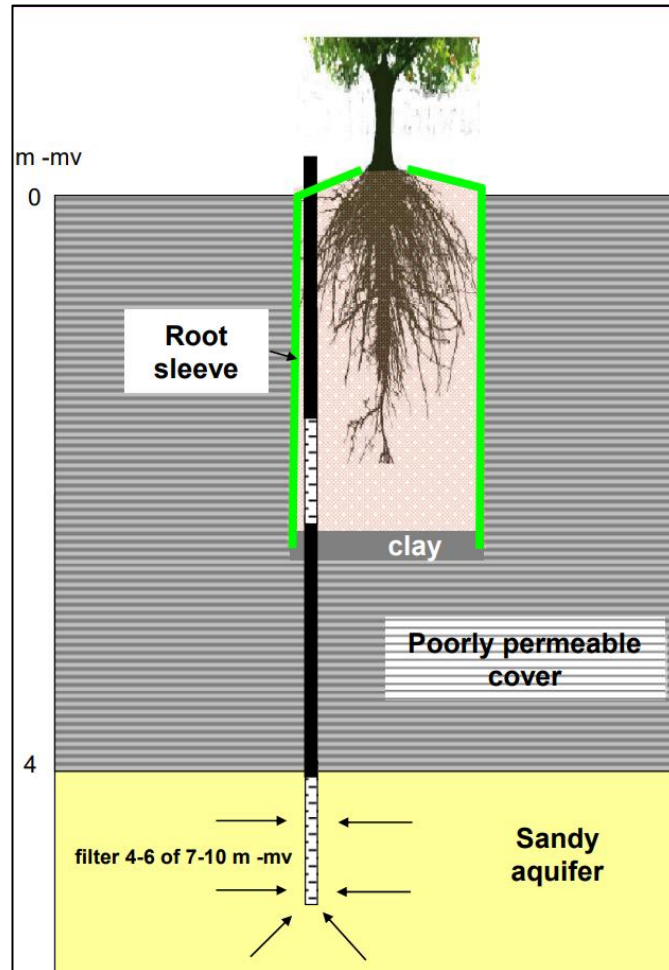
TreeWells

- Controlment of BTEX groundwater contamination at DOW Benelux, Terneuzen, the Netherlands
- Controlment of Chlorinated Hydrocarbons groundwater contamination
- Phytocontainment: geohydrological barrier for pollutants
- Phytostabilization: immobilization of pollutants by adsorption
- Phytoextraction: removal of pollutants by uptake and allocation
- Poplars, Eucalyptus, Willows



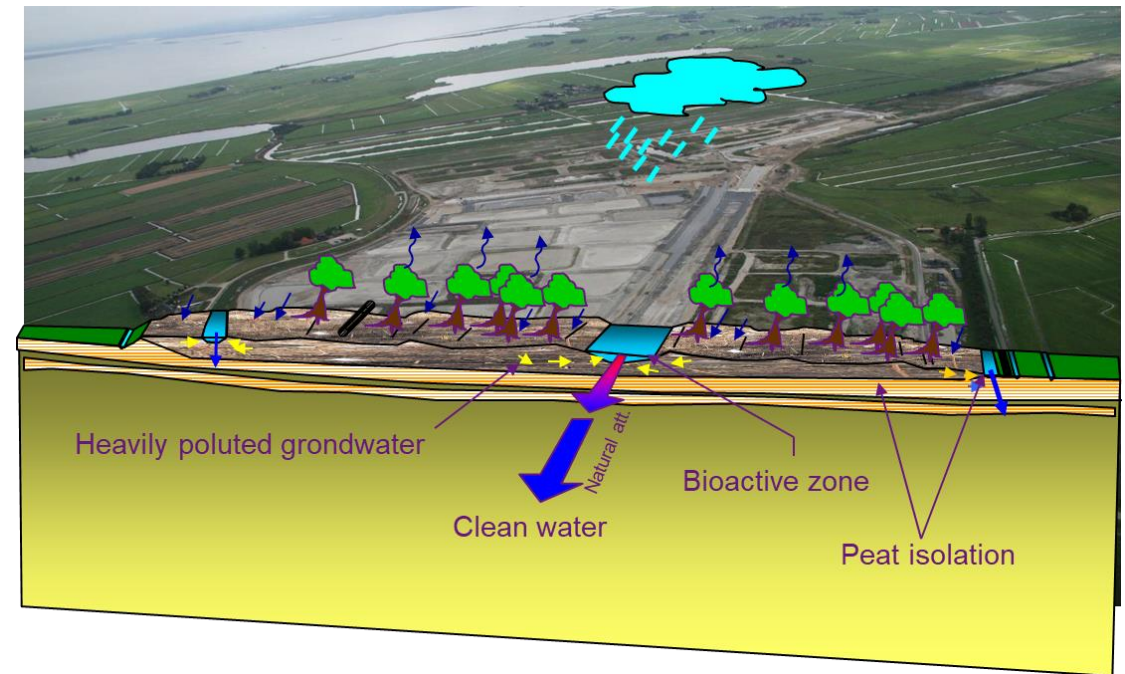
Nature Based Solutions by TAUW bv

TreeWells



Nature Based Solutions by TAUW bv

- Volgermeer landfill site in Amsterdam, the Netherlands
 - 100 hectares landfill in former lake
 - Chemical wastes mixed with 6 MLN m³ of municipal solid waste
- Actions
 - Target waste removal
 - Peat acted as natural barrier
 - Dumpsite covered with waterproof cover
 - Natural peatland installed to give back to nature
 - Monitoring network to assess if contamination is spreading





Nature Based Solutions in Central Asia

Potential for Mine Tailing Remediation

Nature Based Solutions have high potential in Central Asia

Low cost, limited maintenance systems suitable in more remote areas

Reactive Mat can be efficient in the treatment of Acid Mine Drainage

- Biochar and peat are effective adsorbents for cations (heavy metals) due to their negatively charged surface
- Biochar can neutralize acidity, herewith treating AMD

Iron-oxide coated sand filter :

- Heavy metal removal by IOCS through fixation
- Removal of Cu, Cd, Pb, Ni, Cr and Zn from industrial wastewater and stormwater runoff

Treewells:

- Good method for groundwater treatment in both rural and urban areas
 - Phytocontainment by geohydrological barrier for pollutants
 - Phytostabilization and phytoextraction



Thank you for your attention!

Questions?





 Guido van de Coterlet

 +31 6 11 64 36 72

 Guido.vandecoterlet@tauw.com

