

# Management of phosphorus pollution in the Kralingse Plas using Phoslock®

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# Kralingse Plas, Netherlands

- Artificial lake (from historical peat mining) in the City of Rotterdam
- Used recreationally for activities such as fishing, water sports
- Used by > 3 million people annually
- Suffered from poor water quality through external influences and internally from sediment phosphorus release
- Work has been done for several years to improve the water quality of the lake and comply with WFD requirements

Area:	100 ha / 247.1 ac
Volume:	2.5 M m <sup>3</sup> / 88.3 M ft <sup>3</sup>
Avg. Depth:	2.5 m
Max. Depth:	4 m
Dosage:	1,064 tonnes







**Phoslock**

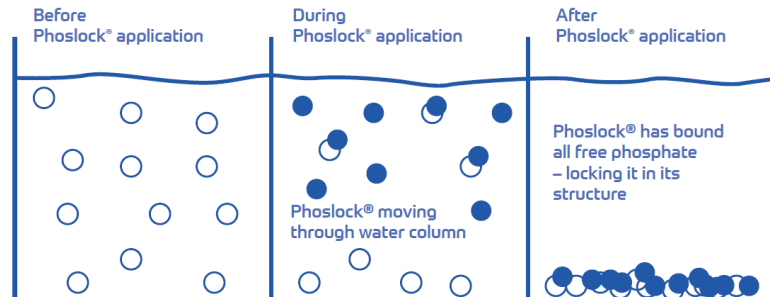
PHOSPHORUS PRECIPITATION

# What is Phoslock?

- Lanthanum-modified bentonite
- Applied as a slurry
- Binds available P under different water quality conditions
- Strips available P from water column and bed sediments
- Produces Rhabdophane, a very stable, inert mineral that is not bioavailable



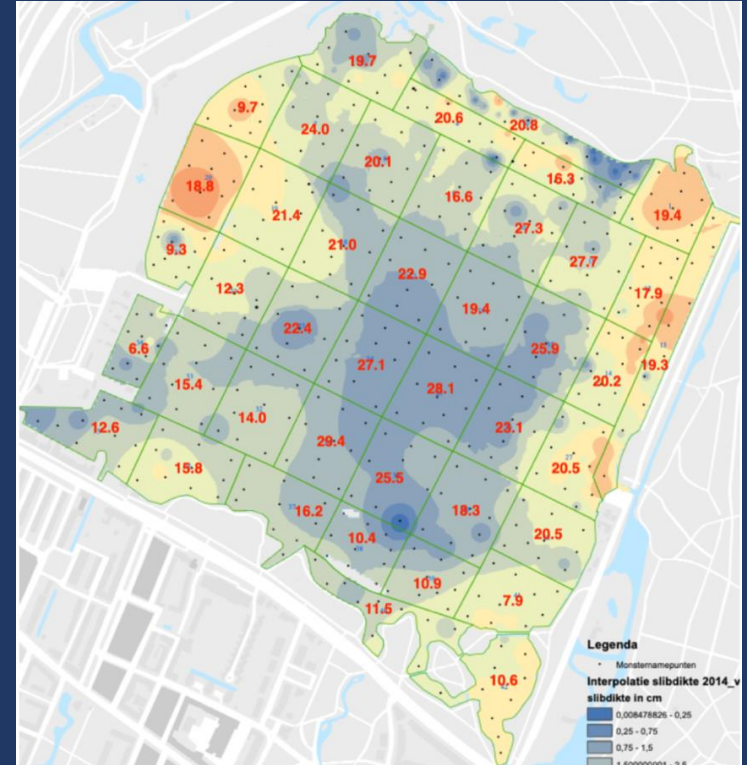
Geo-engineering is the deliberate manipulation of in-lake processes using materials to achieve a desired chemical or ecological outcome





# Kralingse Plas, Netherlands

- Lake split into 42 separate zones
- 10 samples taken in each zone consisting of the top 10 cm sediment layer
- These 10 samples were homogenised and 1 composite sample prepared for each of the 42 zones
- Sediment extractions were performed on these 42 samples
- Phoslock dosage for each individual zone was calculated for the lake



Source: LSI report









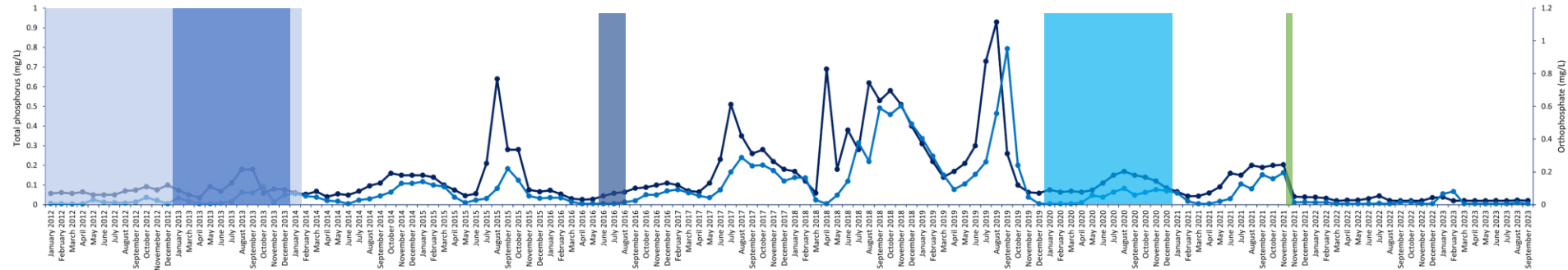
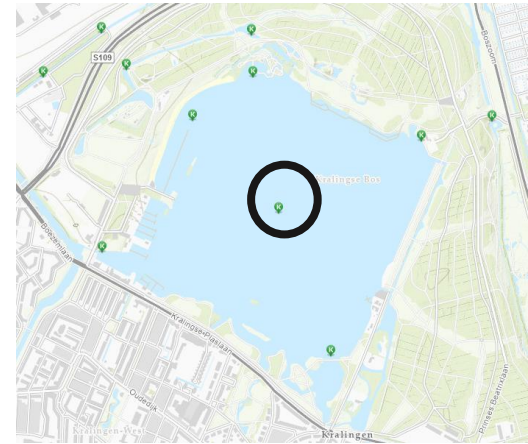




# Kralingse Plas, Netherlands



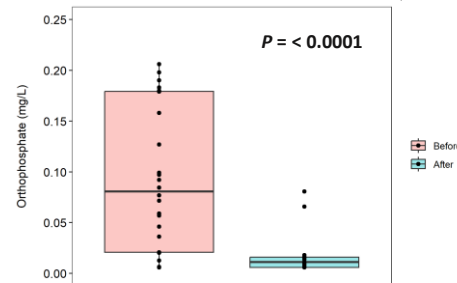
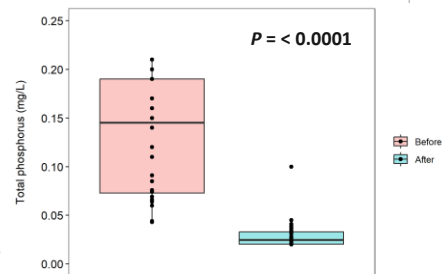
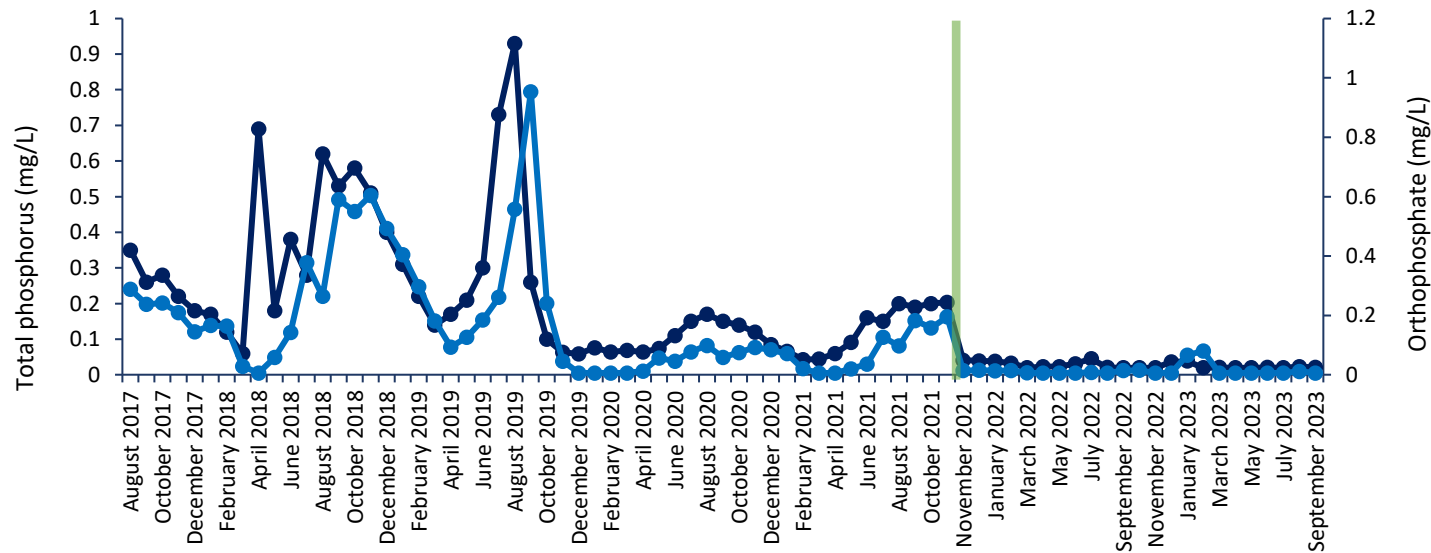
- Dephosphorization unit added
- Removal of contaminated soil from historical sources
- Hydrogen peroxide added
- Multiple catchment/watershed measures implemented
- Phoslock application







# Total phosphorus & Orthophosphate



# Conclusions

- Lanthanum-modified bentonite (Phoslock®) significantly reduced total phosphorus and orthophosphate concentrations to within WFD targets
- Evidence of rapid and permanently binding of P to lanthanum
- A monitoring programme continues (water column and sediment) to assess longer –term success







# Special Thanks

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- Anne Mollema
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- Said Yasseri
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