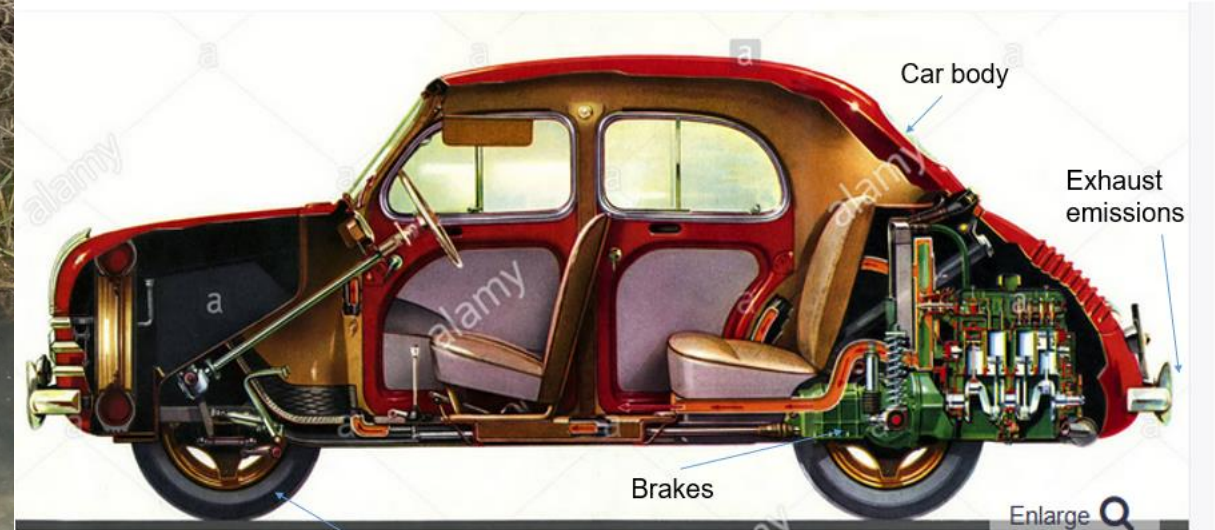




Pollution Remediation using NbS's

John Bryden – Head of Improving Rivers

Road Runoff Pollution



Not just the traffic: road markings, road materials, street furniture, accidental spills, construction erosion



British
Geological
Survey



Decision Support Tool for Pollution Solutions

[Road Pollution Solutions Tool \(bgs.ac.uk\)](https://mapapps.bgs.ac.uk/road-pollution-solutions/)

[//mapapps.bgs.ac.uk/road-pollution-solutions/](https://mapapps.bgs.ac.uk/road-pollution-solutions/)

Political Impact

Mayor of London, Sadiq Khan said: “This report provides clear evidence that pollution from the surface of London’s roads is posing a significant risk to our rivers. We’re working with partners to find solutions that prevent water contamination, but the Government must step up to provide the Environment Agency and highways authorities with the appropriate funding for these measures to properly protect the capital’s rivers.”

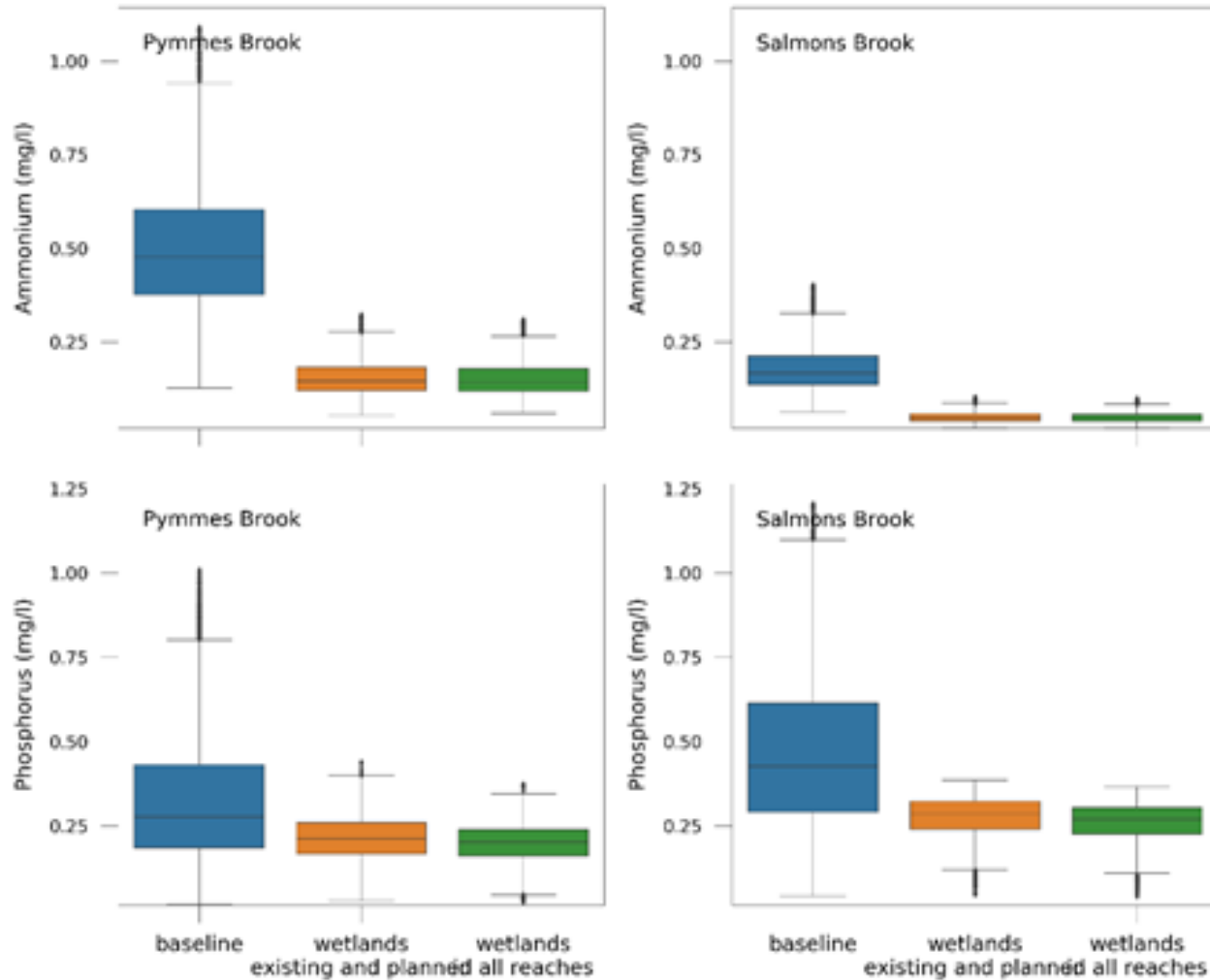
SUPPORTED BY

MAYOR OF LONDON



TRANSPORT
FOR LONDON

Constructed Wetlands – Water Quality Improvement at Catchment Scale



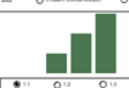
- Blue = Baseline conditions
- Orange = identified wetlands
- Green = wetlands everywhere

Wetland Pollution Remediation Tool

- Rivers Trust with support from Natural England are developing a tool to help size wetland treatment systems.
- Based on work P – K – C model, which is the standard model used for constructed wetlands design (Kadlec and Wallace, 2009)
- Requires several inputs including inflow concentrations, flow and temperature.
- Users can select whether to solve the equation to calculate wetland area, outlet concentrations or load reduction.
 - BOD, Total N and Total P can be modelled..0

INPUTS - required by all

Select goal: Wetland area Effluent concentration Load reduction

Select wetland cell ratio: 

Select number of cells: 3 cells

Influent concentration (Ci) mg/l
 Ci BOD:
 Ci TN:
 Ci TP:

Average annual temperature (water) °C:
 Q (minimum) m³/day:
 Q (maximum) m³/day:

INPUTS - GOAL DEPENDANT - WETLAND AREA

Target effluent concentration (Ce)

Ce BOD mg/l	30
Ce TN mg/l	2.87
Ce TP mg/l	0.52

INPUTS - GOAL DEPENDANT - EFFLUENT CONC

Area available for wetland m²: 100

INPUTS - GOAL DEPENDANT - LOAD REDUCTION

Area available for wetland m²: 487.12

OUTPUTS - GOAL DEPENDANT - WETLAND AREA

	BOD	TN	TP
Area required m ²	27.49	382.81	276.28
Minimum throughput	109.95	1531.22	1195.11
Maximum throughput			

Area required m²: 1531.24

$$A = \frac{PQ}{k_1} \left(\left(\frac{C_i - C_e}{C_i - C_e} \right)^2 - 1 \right)$$

Indicative retention time (for ~ 0.2 m depth)

Days for Q minimum	61.25
Days for Q maximum	15.31

OUTPUTS - GOAL DEPENDANT - EFFLUENT CONC

	Ce BOD + Ca TN mg/l	Ce TP mg/l
Minimum throughput	5.45	4.62
Maximum throughput	15.19	12.76

Indicative retention time (for ~ 0.2 m depth)

Days for Q minimum	12.00
Days for Q maximum	3.00

OUTPUTS - GOAL DEPENDANT - LOAD REDUCTION

	BOD	TN	TP
Minimum throughput	10%	15%	13%
% load remaining	10%	15%	13%
Treatment efficiency	90%	85%	88%
Load removed kg/yr	81.83	31.21	3.21
Nominal effluent concentration (mg/l)	5.19	2.90	0.24
Maximum throughput			
% load remaining	23%	31%	54%
Treatment efficiency	77%	69%	46%
Load removed kg/yr	291.23	71.87	6.64
Nominal effluent concentration (mg/l)	15.11	10.18	1.00

Indicative retention time (for ~ 0.2 m depth)

Days for Q minimum	18.88
Days for Q maximum	4.67

Private Sector funding Nature Based Solution



WATER STEWARDSHIP – *‘use of water that is socially and culturally equitable process that includes both site- and catchment-based actions.’* – Alliance for Water Stewardship



-  GOOD WATER GOVERNANCE
-  SUSTAINABLE WATER BALANCE
-  GOOD WATER QUALITY STATUS
-  IMPORTANT WATER-RELATED AREAS
-  SAFE WATER, SANITATION AND HYGIENE FOR ALL (WASH)

Volumetric Water Benefit Accounting ('VWBA') is the global standardised method for assessing the benefits of water stewardship activities. Otherwise known as 'replenish'



Thank you!

