Supplementary Materials: Filtering Capability of Porous Asphalt Pavements

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Supplementary Data

Table S1. Characterization of aggregates.

Parameter	Coarse Aggregates		Fine Aggregates
	3/4″	3/8″	Φ < 4.75 mm
Apparent specific gravity (Gsa)	2.774	2.740	2.717
Bulk specific gravity (Gsb)	2.748	2.701	-
Absorption (%)	0.351	0.521	-

Table S2. Characterization of asphalt rubber.

Parameter	Standard	Specification	Results
Penetration 25 °C, 100 g, 5 s (0.01 mm)	ASTM D5	25 to 75	42.0
Softening point (°C)	ASTM D 36	54.4 min.	67.7
Apparent viscosity (cP) 175 °C	ASTM D 2196	1500 min.	1644
Resilience (%)	ASTM D 5329	20.0 min.	33.0
RTFOT 163 °C, 85 min	ASTM D 2872		
Change in mass (%)	ASTM D 2872	0.6 max.	0.3
Softening point (°C)	ASTM D 36	-	2.9
Penetration 25 °C, 100 g, 5 s (0.01 mm)	ASTM D5	-	25.3
Retained penetration (%)	ASTM D 2872	-	60.2
Apparent viscosity (cP) 175 °C	ASTM D 2196	-	1962
Resilience (%)	ASTM D5	-	32.0

Table S3. Aggregate gradation specifications and gradation curves.

Sieves		Specifications			Gradation Curves		
		% Passing			% Passing		
Inches/No.	mm	Caltrans	CPA	PMQ	Caltrans	CPA	PMQ
3/4″	19.0	100	-	100	100	-	100
5/8″	16.0	-	-	88–100	-	-	94
1/2″	12.5	95–100	100	78–94	97.5	100	86
3/8″	9.5	79–89	70–90	60–80	83	90	70
No. 4	4.8	28–37	15–30	44–60	32	30	52
No. 10	2.0	-	10–22	-	-	16	-
No. 8	2.4	7–18	-	-	-	-	-
No. 40	0.4	-	6–13	20–35	12.5	11	27
No. 30	0.6	0–10	-	-	-	-	-
No. 80	0.18	-	-	12–24	6.5	-	18
No. 200	0.075	0–3	3–6	9–12	1.5	4	1.5

Table S4. Porous layers gradation specifications.

Sieves		Porous Layers			
Inches/No.	mm	Choker Course (UNHSC, 2009)	Filter Course (UNHSC, 2009)	Reservoir Course (UNHSC, 2009)	BGS (Grade C) (Brazil, 2016)
		% Passing			
2½″	63.0	-	-	100	-
2″	500.0	-	-	90–100	-
1½	37.5	100	-	35–70	-
1″	25.0	95–100	-	0–15	100
¾″	19.0	-	-	-	-
½″	12.5	25–60	-	0–5	-
3/8″	9.5	-	100	-	50–85
No. 4	4.8	0–10	70–100	-	35–65
No.10	2.0	-	-	-	40–70
No. 8	2.4	0–5	-	-	-
No. 40	0.42	-	-	-	35–45
No. 200	0.075	-	0–6	-	10–25

Table S5. Porous layers gradation specifications.

Layers	Model A			Model B		
	Name	Thickness (cm)	Specification	Name	Thickness (cm)	Specification
Surface	CPA	7.0	DNER-ES 386/99	Caltrans	7.0	Caltrans OPFG 1/2″
Choker course	PMQ	5.0	PMSP-ESP10/92 Grade I	Choker course	5.0	UNHSC (2009)
Filter course	-	-	-	Filter course	15.0	UNHSC (2009)
Reservoir course	BGS	15.0	DNIT 031/2006—ES	Reservoir course	16.0	UNHSC (2009)
Total thickness (cm)		27.0			43.0	

Table S6. Amount of rainwater infiltrated through the porous asphalt mixtures slabs and the control.

Parameters	Asphalt Mixtures Slabs			Rainwater in the Control (mm)
	Caltrans	CPA	PMQ	
Maximum amount of rainwater (mm)	40.0	47.0	43.0	47.0
Minimum amount of rainwater (mm)	2.0	5.0	3.0	5.0
Average amount of rainwater (mm)	14.9	18.5	16.1	20.4
Standard deviation (mm)	10.9	10.8	9.9	9.3

Table S7. Amount of rainwater infiltrated in the models and the control.

Parameters	Models		Rainwater in the Control (mm)
	A	B	
Maximum amount of rainwater (mm)	8.7	8.7	8.7
Minimum amount of rainwater (mm)	1.0	1.0	1.1
Average amount of rainwater (mm)	3.3	3.5	3.8
Standard deviation (mm)	2.2	2.3	2.2

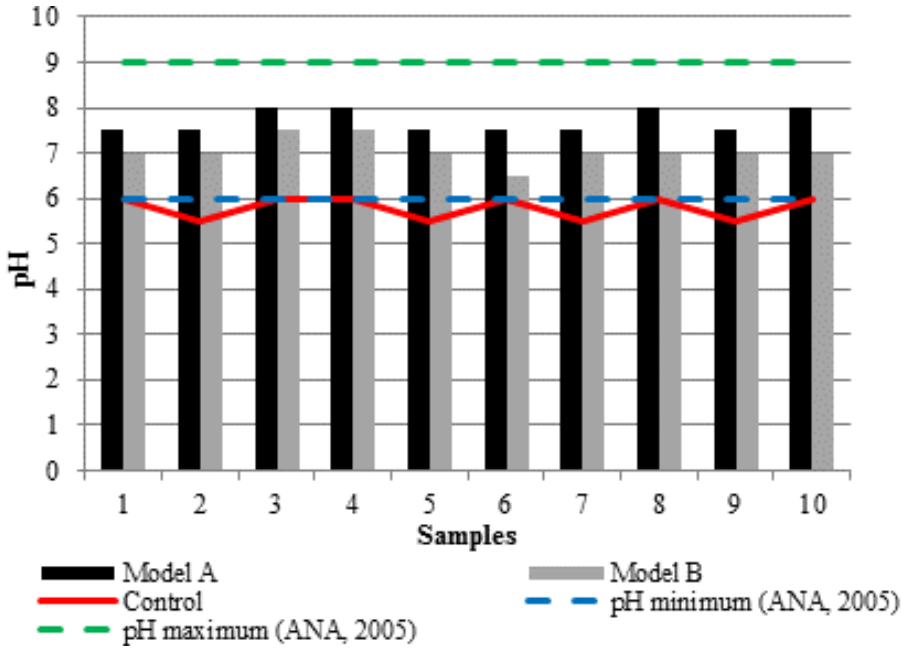


Figure S1. pH in rainwater samples for models A and B.

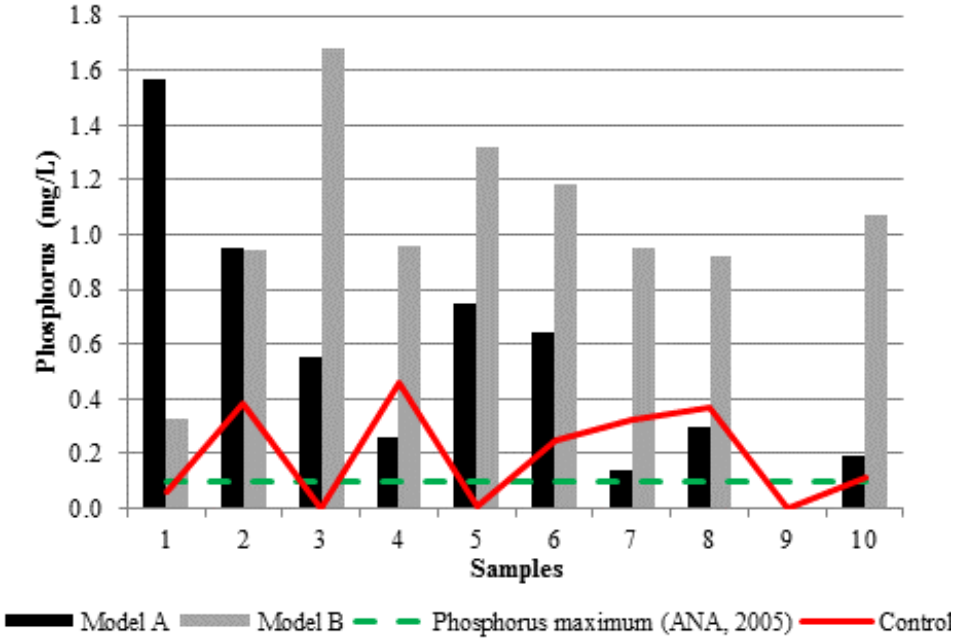


Figure S2. Phosphorus in rainwater samples for models A and B.

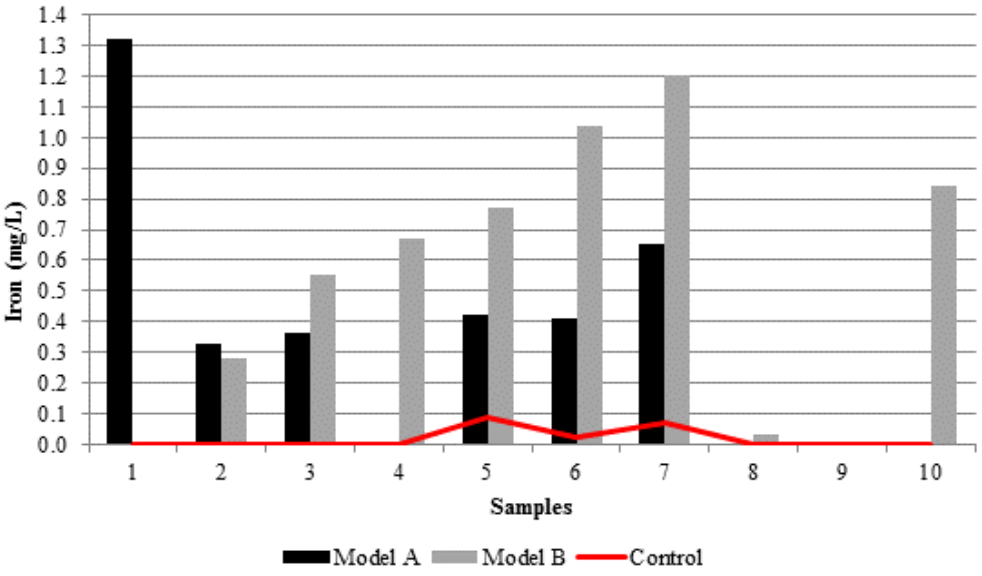


Figure S3. Iron in rainwater samples for models A and B.

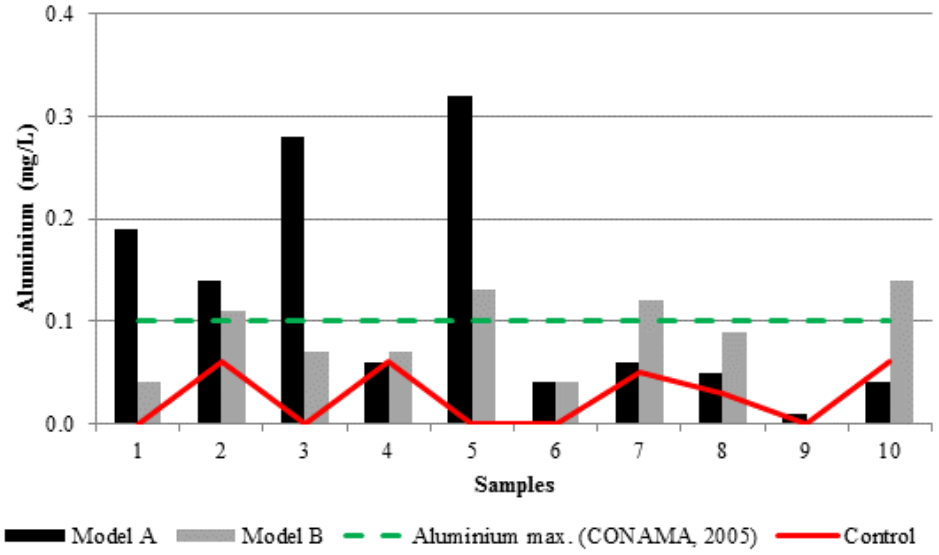


Figure S4. Aluminium in rainwater samples for models A and B.

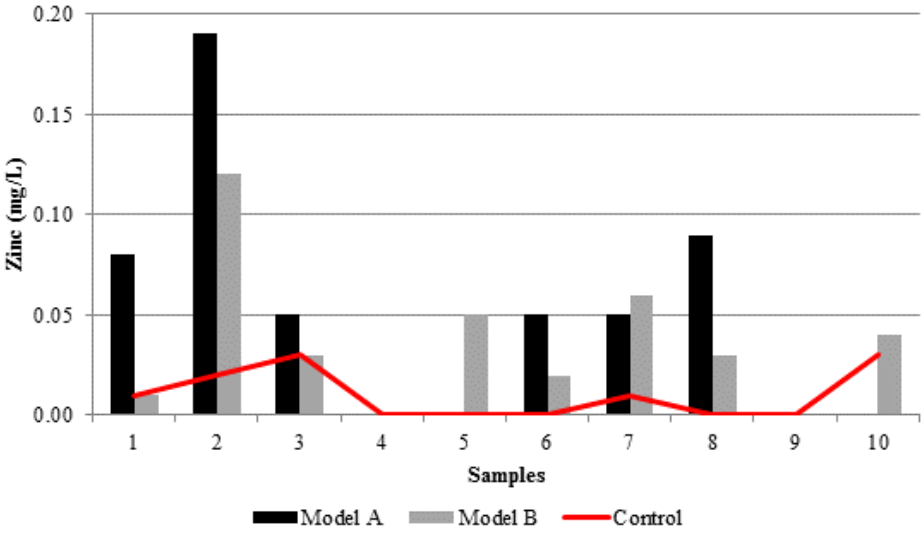


Figure S5. Zinc in rainwater samples for models A and B.

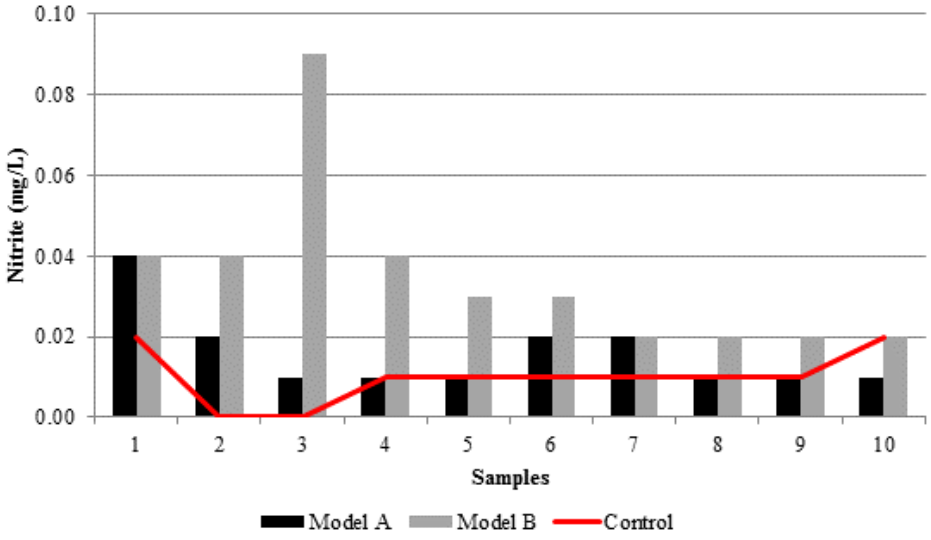


Figure S6. Nitrite in rainwater samples for models A and B.

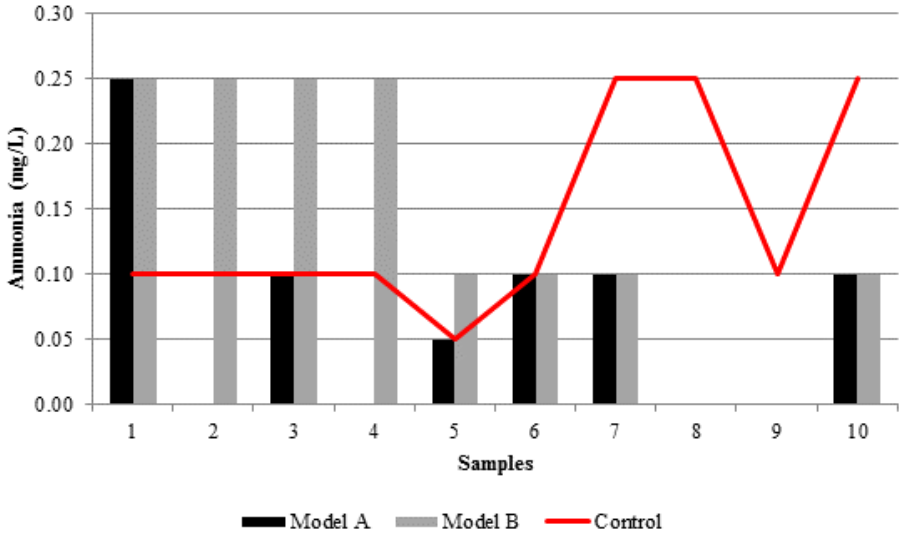


Figure S7. Ammonia in rainwater samples for models A and B.

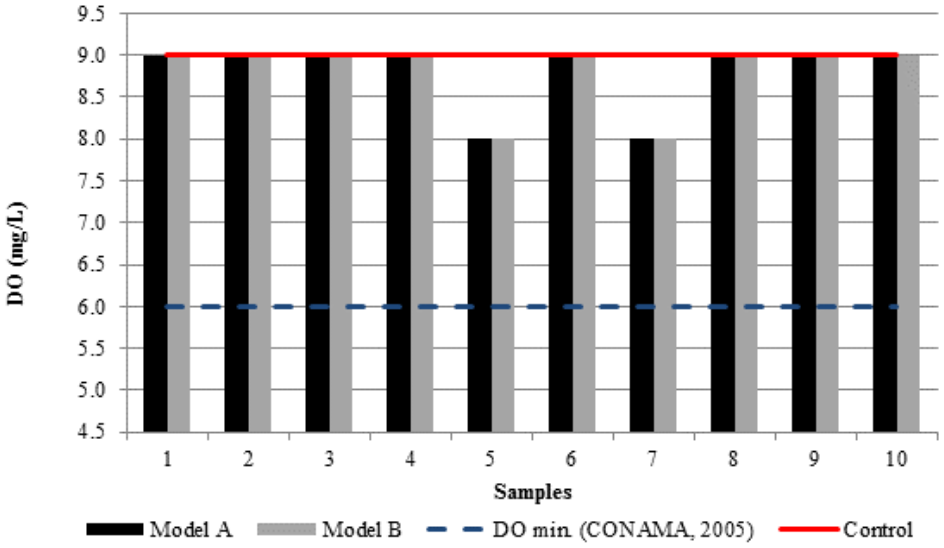


Figure S8. Dissolved oxygen (DO) in rainwater samples for models A and B.

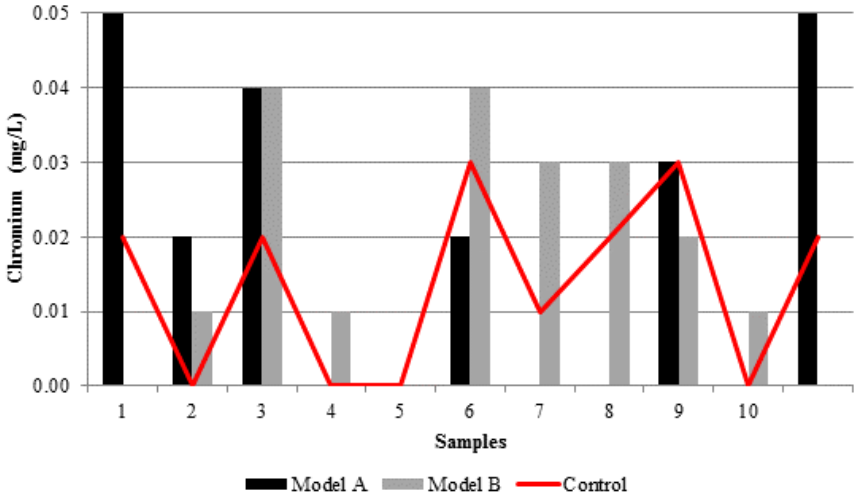


Figure S9. Chromium in rainwater samples for models A and B.

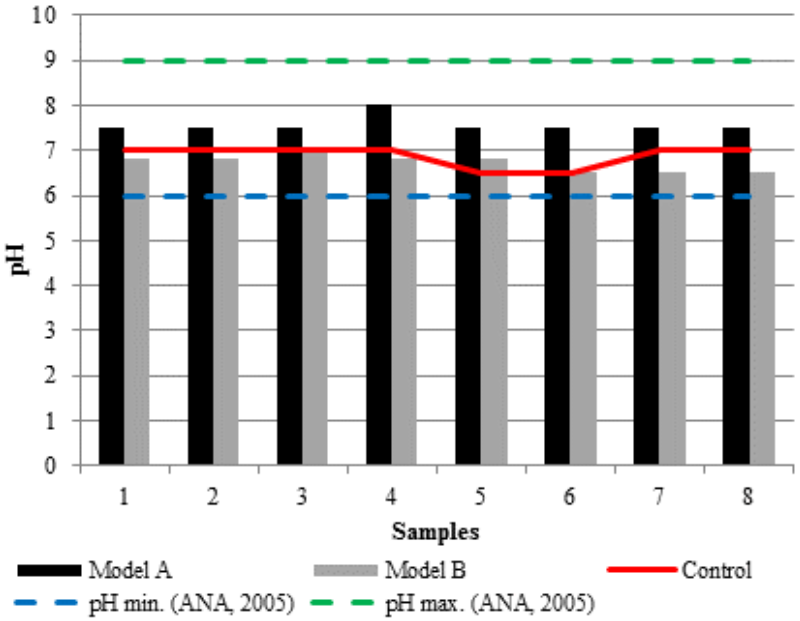


Figure S10. pH in stormwater runoff samples for models A and B.

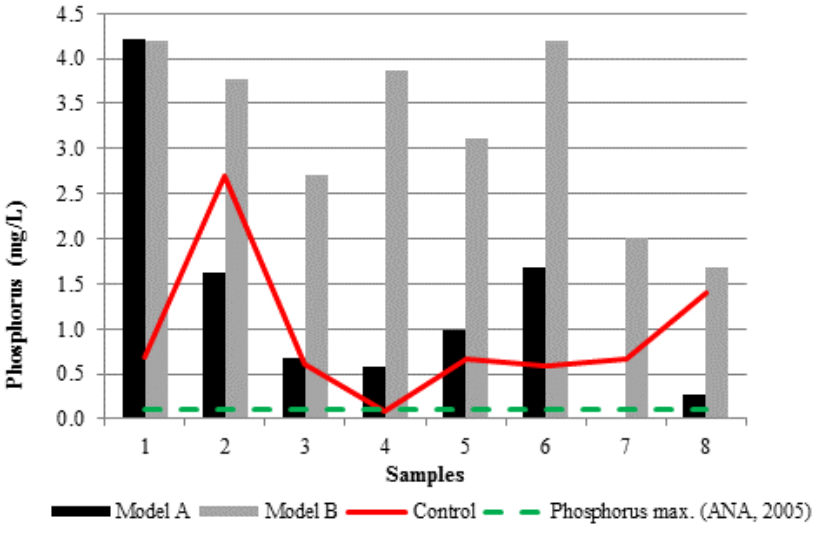


Figure S11. Phosphorus in stormwater runoff samples for models A and B.

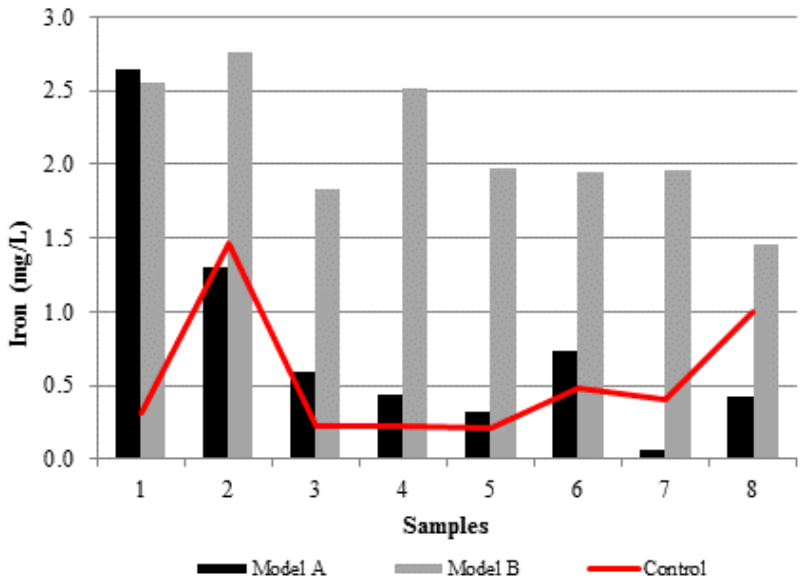


Figure S12. Iron in stormwater runoff samples for models A and B.

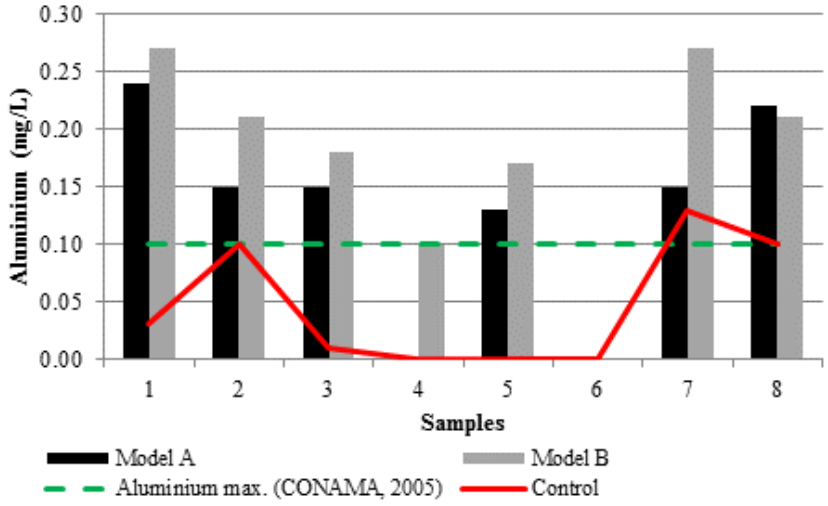


Figure S13. Aluminium in stormwater runoff samples for models A and B.

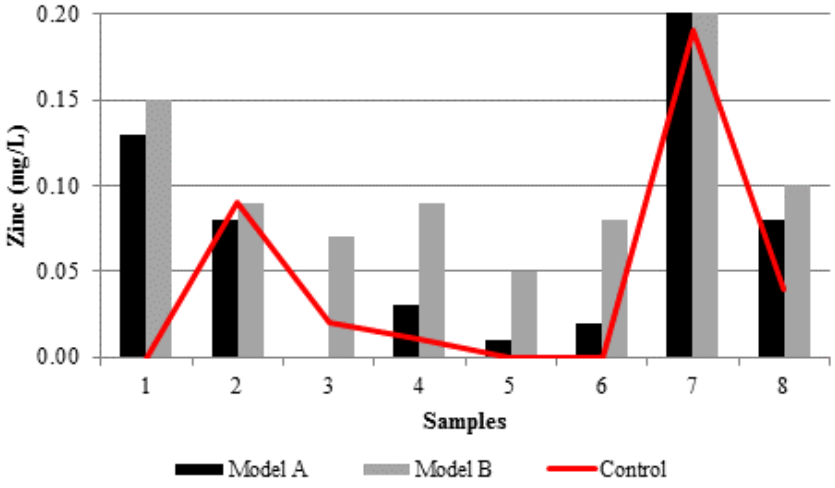


Figure S14. Zinc in stormwater runoff samples for models A and B.

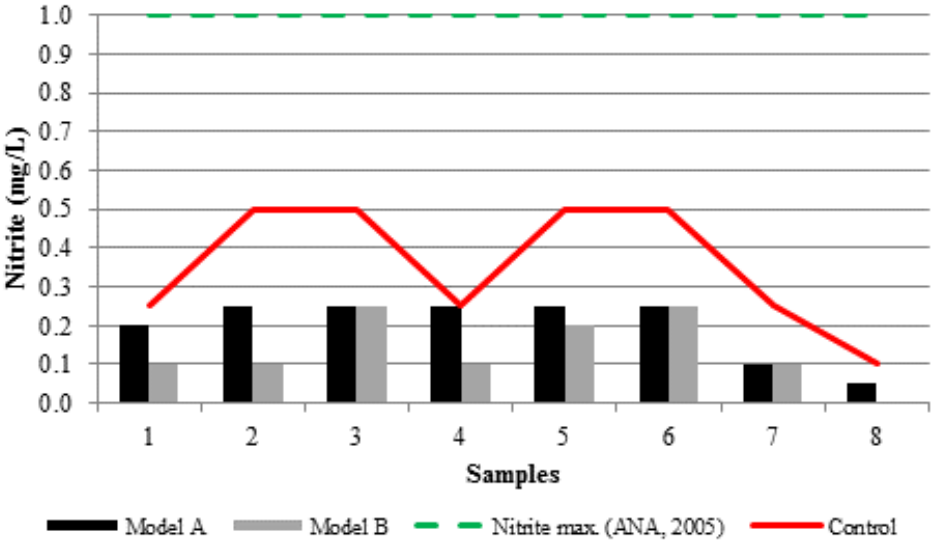


Figure S15. Nitrite in stormwater runoff samples for models A and B.

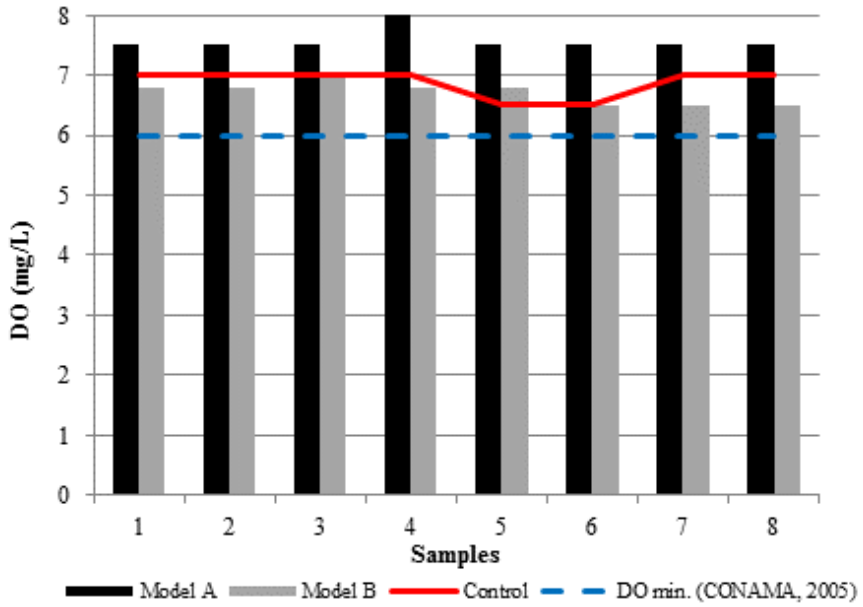


Figure S16. Dissolved oxygen (DO) in stormwater runoff samples for models A and B.

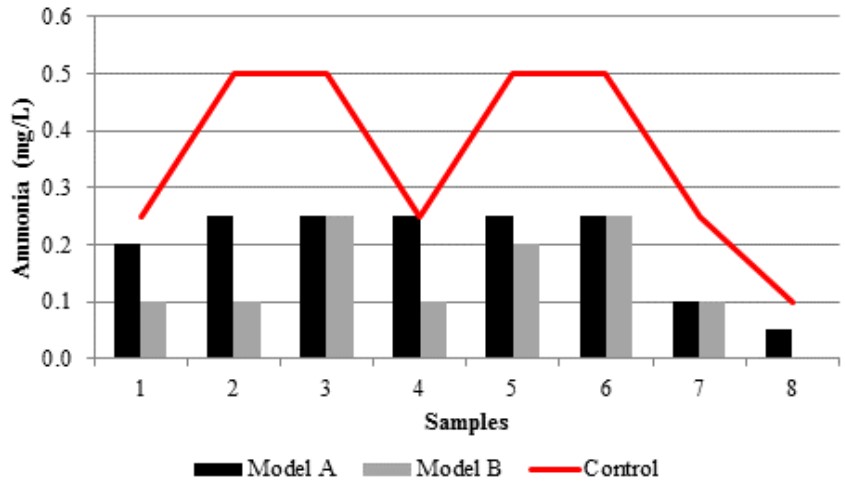


Figure S17. Ammonia in stormwater runoff for models A and B.

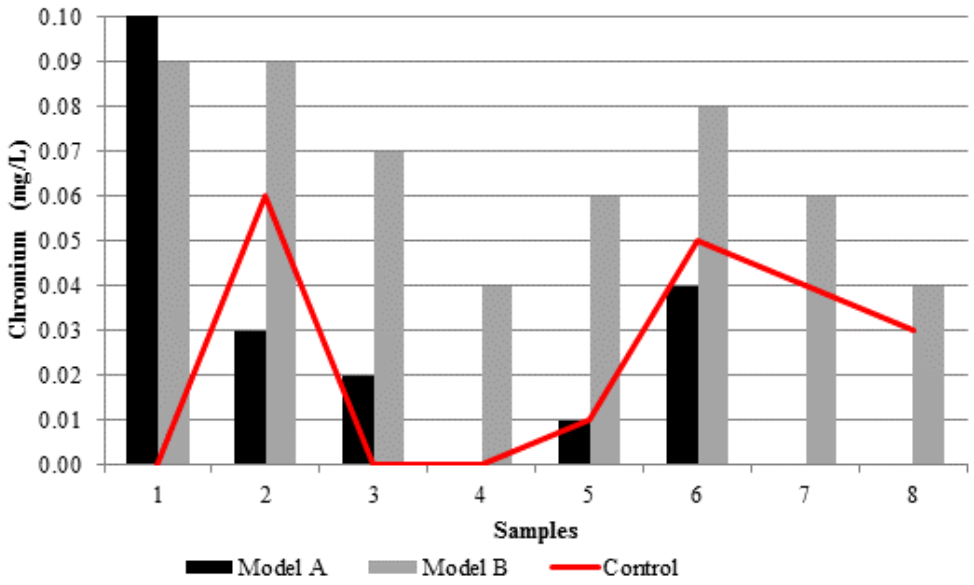


Figure S18. Chromium in stormwater runoff samples for models A and B.

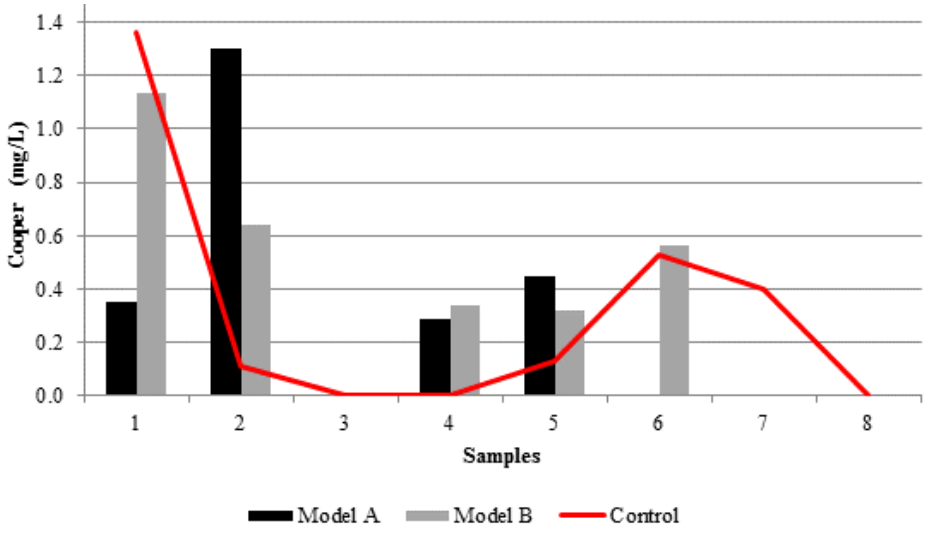
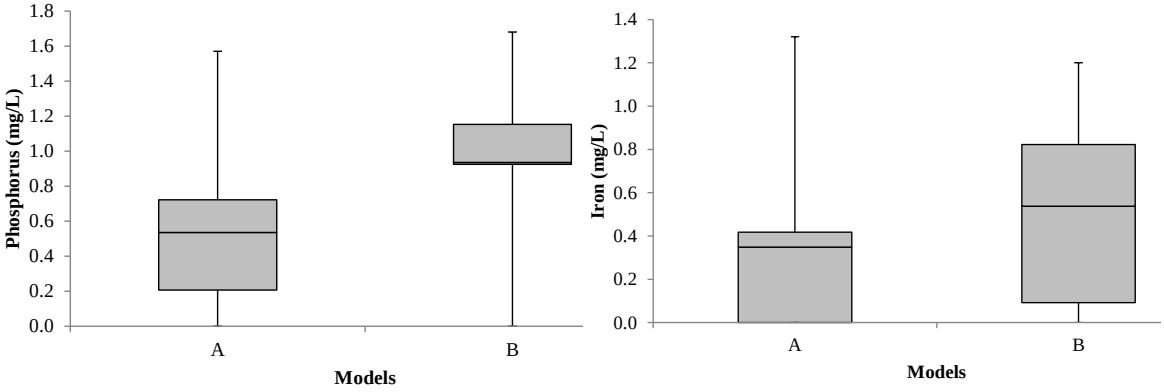


Figure S19. Copper in stormwater runoff samples for models A and B.



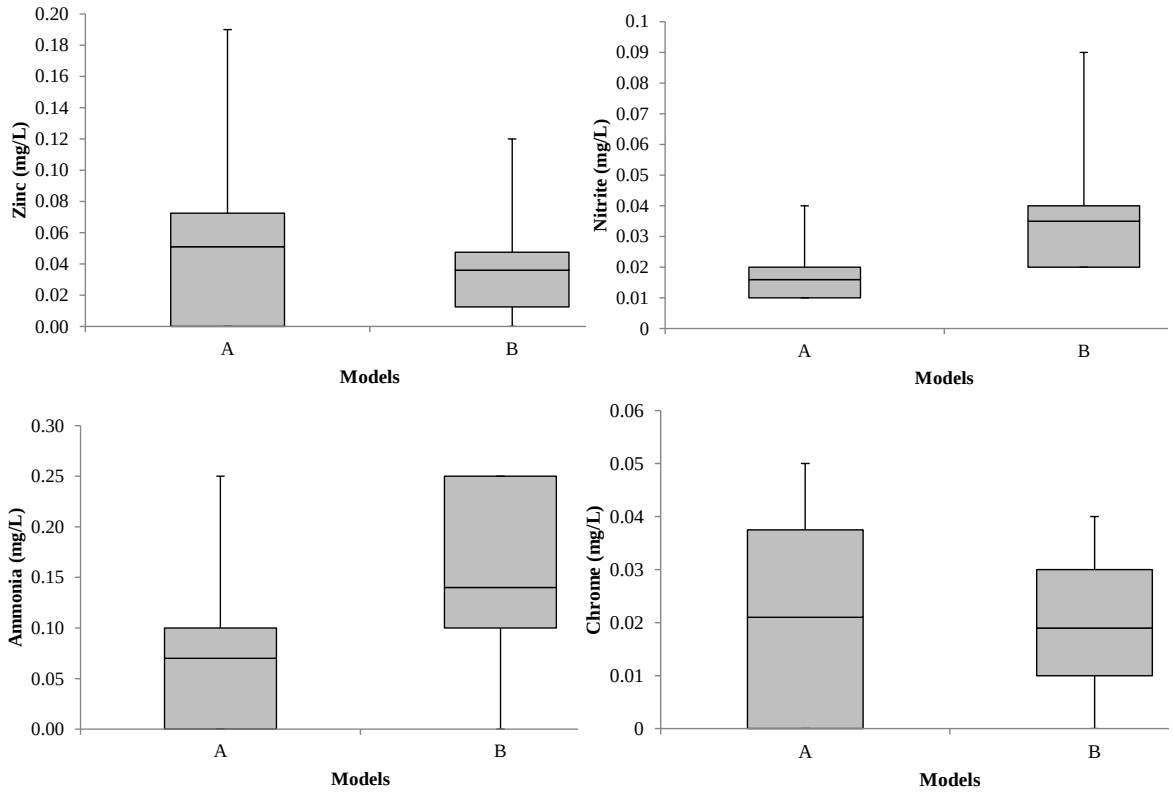
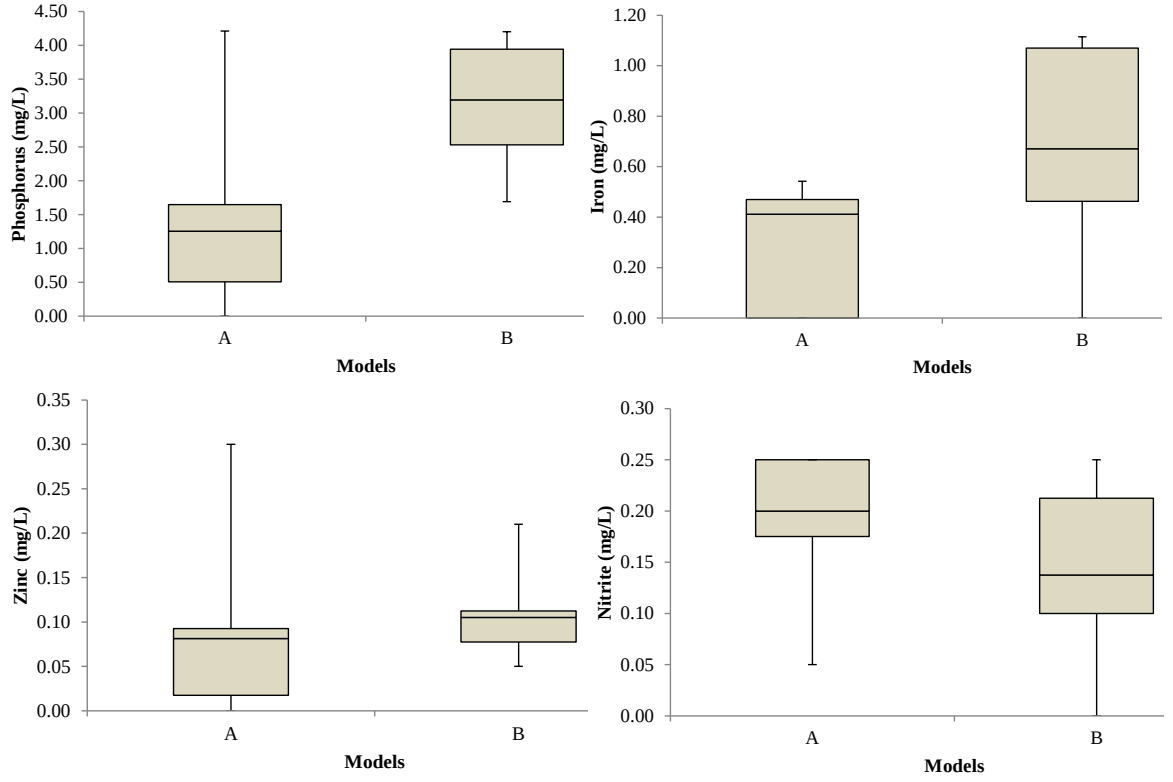


Figure S20. Statistical analysis for rainwater samples for models A and B.



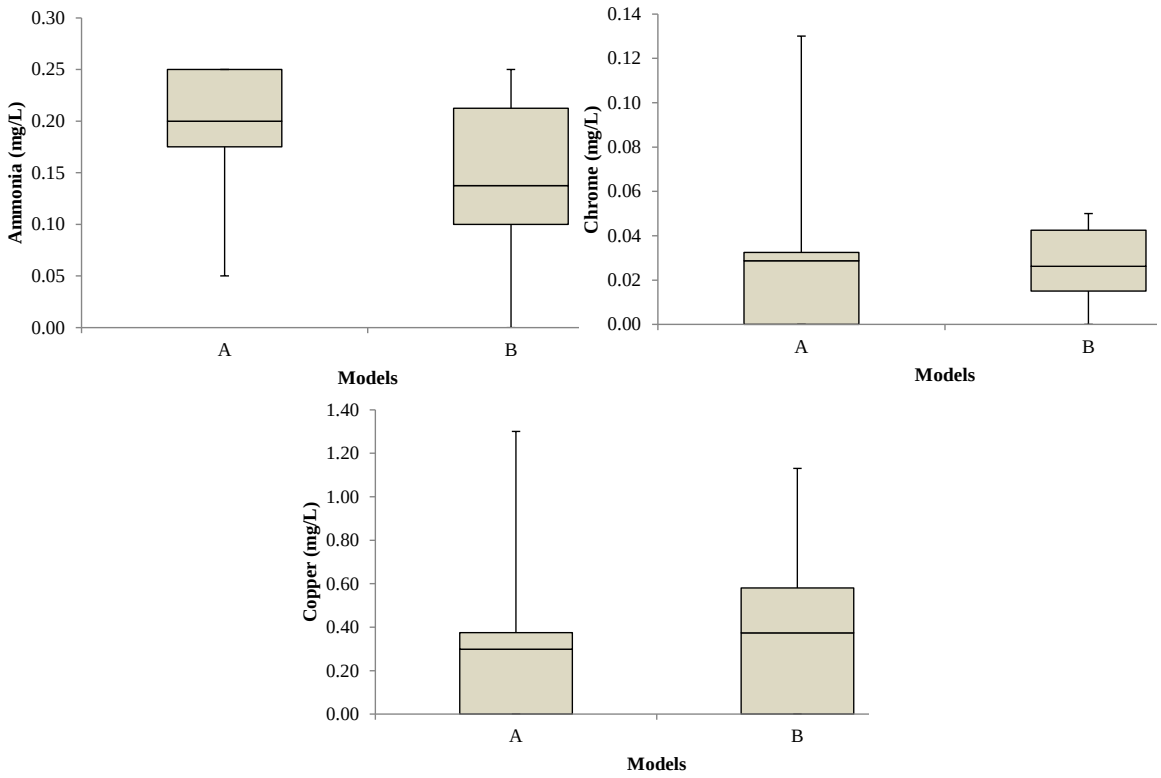


Figure S21. Statistical analysis for stormwater runoff samples for models A and B.